THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CVIII. No. 2427.] LONDON, NOVEMBER 16, 1909. [61ST YEAR. PRICE 6d.

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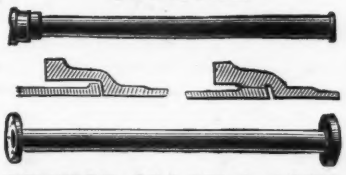

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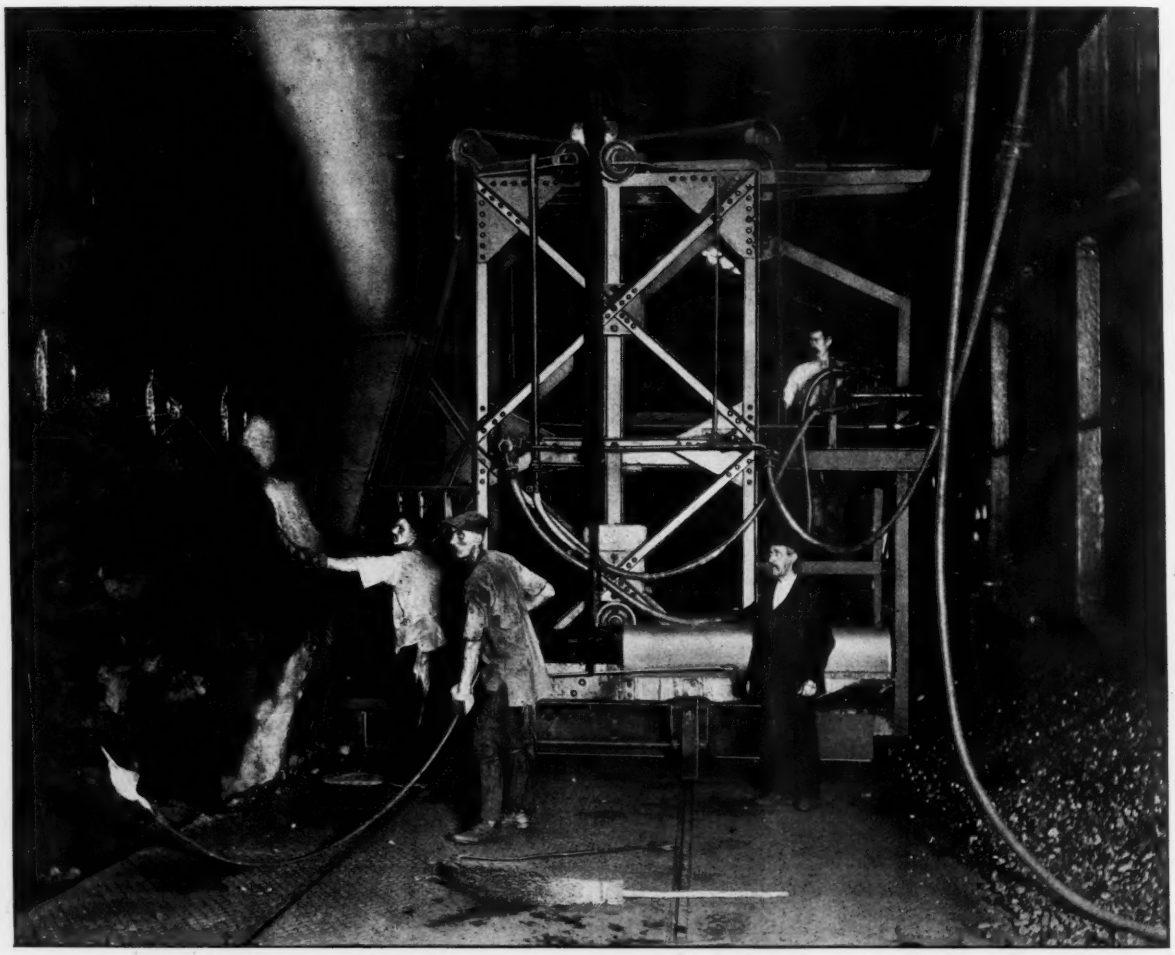

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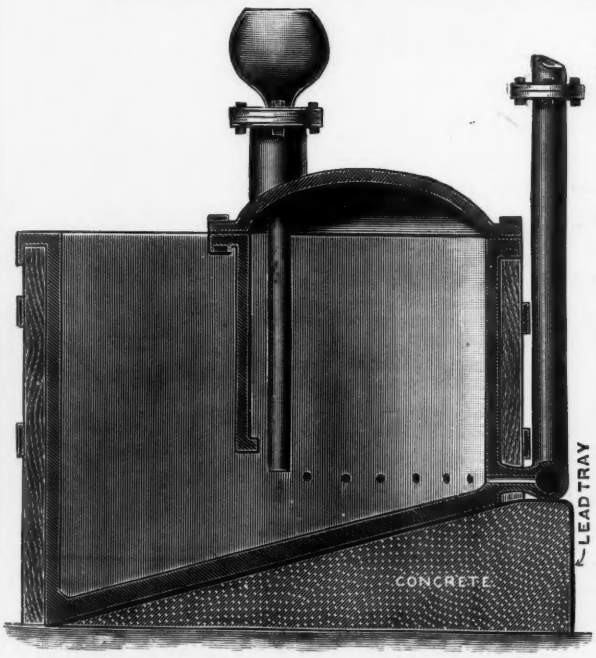

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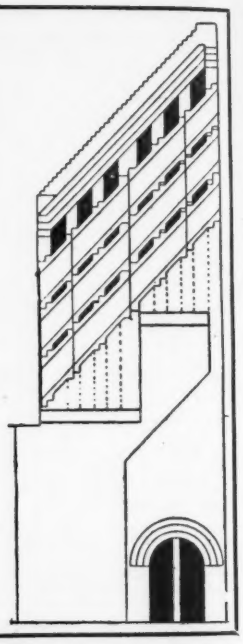

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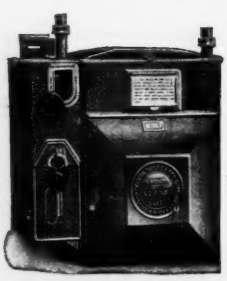

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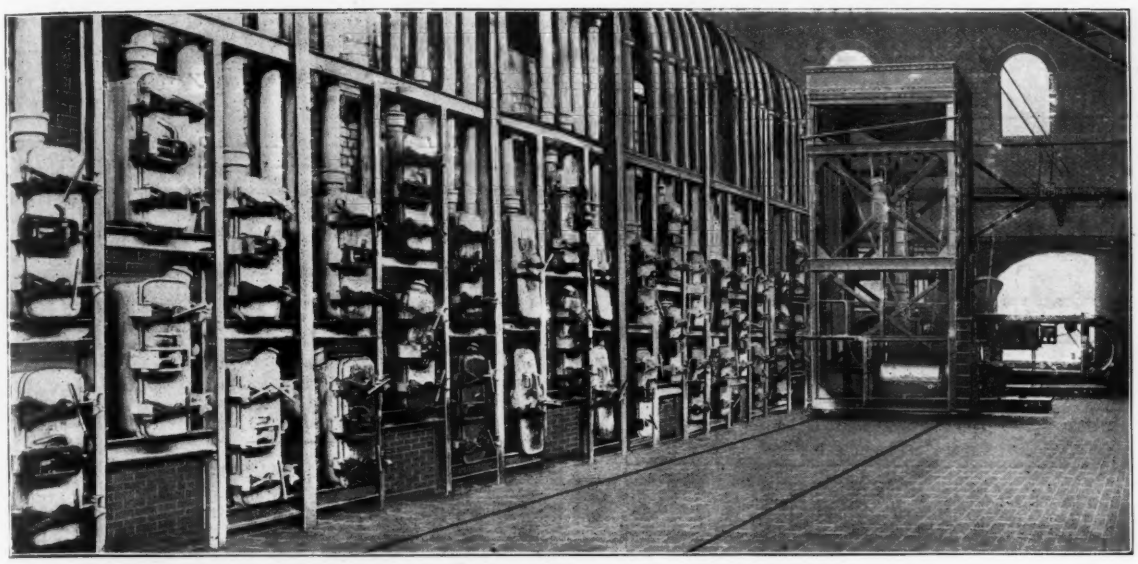

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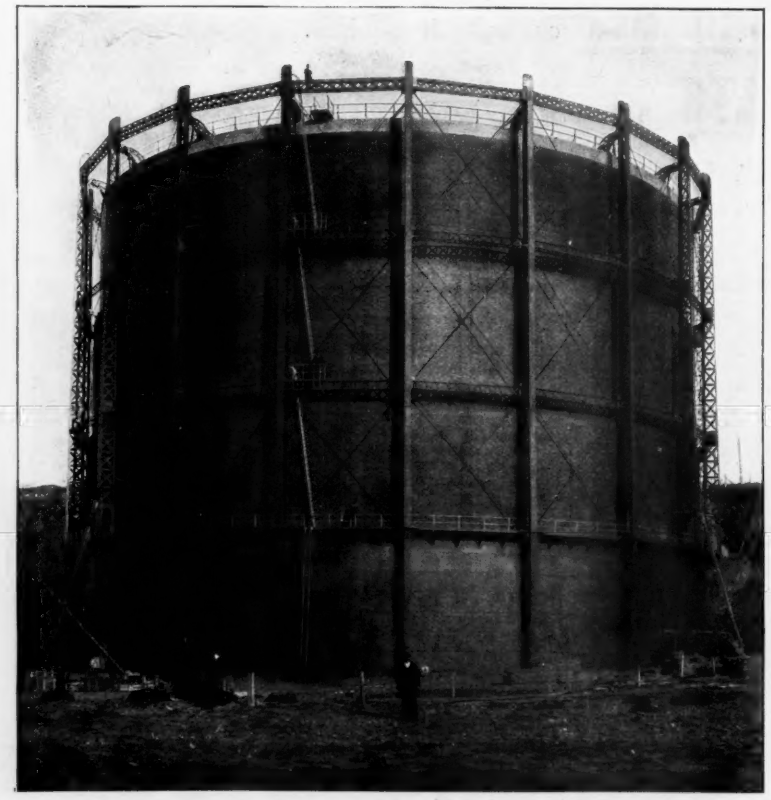

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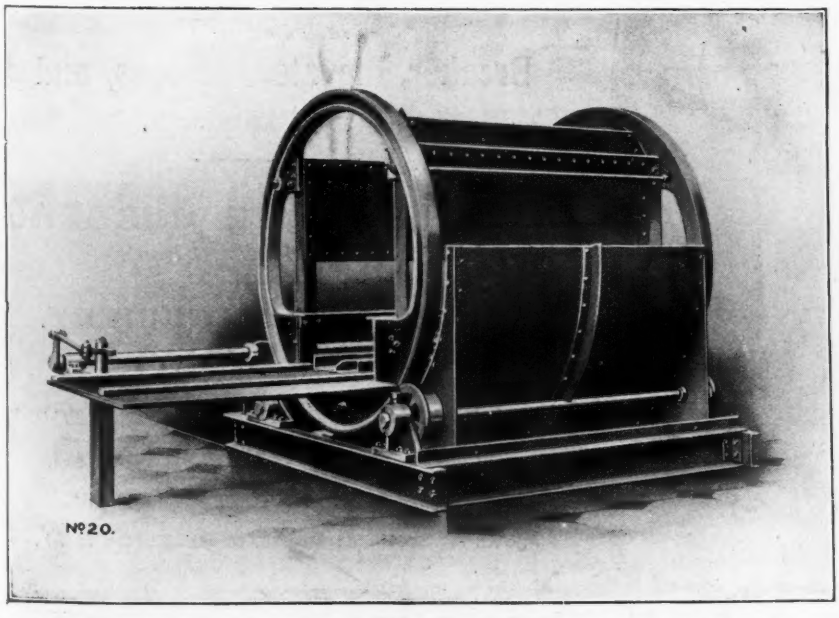

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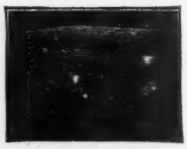

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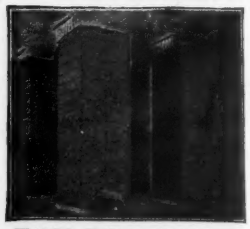

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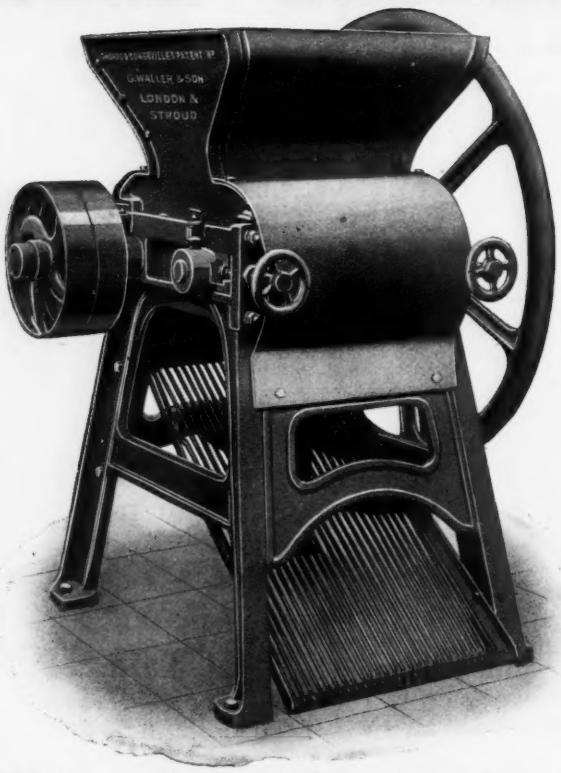

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CONTENTS.

EDITORIAL NOTES.

Gas, &c.—
The Uneconomic Object of Municipal Service 451
The Gas Workers' Strike in Italy . . . 452
Paving the Way 452
A Suggestion for the Refractory Materials Committee. 453
Novel Prepayment Methods 453
The Gas Companies' Joint Standard Burner Bill — Construction of Unauthorized Works: Barnet Case—More Revelations —Brockenhurst Again 453

Gas Stock and Share Market 455
Electricity Supply Memoranda 455
Personal and Obituary 456
The Strike of Gas Workers' in Italy . . . 457
New Holder for the Enfield Gas Company . 460
Lighting of Alexandra Palace 462
British and German Retorts 464
Flicker Photometer and the Eye 464
Milne's Gas Fittings and Lamps 465
The "Venus" Gas-Lamps 465
Some Aspects of the Gas Industry. By J. G. Newbigging, M.Inst.C.E. 466
Economic Aspects of the Slot-Meter System 470
A Booster System at Rochester (N.Y.) . . . 471
Determining the Volatile Matter in Coal . . 471
A Combined Stopcock and Governor . . . 472
Visit to Vauxhall Gas-Works by the London and Southern Junior Gas Association . . 473
Midland Junior Association—Visit to the Foleshill Gas-Works, Coventry 474
Scottish Junior Gas Association—Eastern District—Quarterly Meeting—
Mr. R. B. Chalmers on Notes on Money-Saving Devices for Small Gas-Works. . 475

REGISTER OF PATENTS.

Burners for Incandescent Gas-Lamps—Lecomte, J. M., and Roy, M. 477
Purifying Gases Generated by Dry Distillation, and Obtaining Bye-Products Therefrom—Burkheiser, K. 477
Treating Tar to Facilitate Subsequent Distillation—Guthensohn, A. 478
Gas-Burners—Wardle, G. 478
Automatic Closing Valve for Gas—M'Carthy, M. & P. 478
Supporting Inverted Incandescent Mantles—Beal, W. 478
Vertical Retorts—Robert Dempster and Sons, Limited, and Toogood, H. J. 478
Ladders for Gasholders—Downs, J. H., and Wright, H. F. 479
High-Pressure Gas-Mains—Waddell, A., and the Bryan Donkin Company, Limited . . 479
Applications for Letters Patent. 480

MISCELLANEOUS NEWS.

Rawcliffe (Yorks.) and District Gas and Coke Company, Limited 482
Gas Stock and Share List 484
Public Lighting of Cobham 485
Oriental Gas Company, Limited 485
Effects of the Mines (Eight Hours) Act . . 486
Notes from Scotland 486
Current Sales of Gas Products 488
Coal Trade Reports 488

LEGAL INTELLIGENCE.

Construction of Unauthorized Water-Works —Judgments in the Barnet Case. . . . 480
Damage to Gas-Mains by Tramways . . . 481
Laindon and District Gas Company . . . 482
The Bankruptcy of Mr. Charles Scott-Snell . 482

PARAGRAPHS.

The Westminster Technical Institute . . . 454
Gas *v.* Electricity for Cooking and Heating—Specific Gravity of Coal—A New Name for the International Unit of Light 466
Royal Society of Arts 471
Fire-Clay Deposits in India—An Aluminium Gas-Stove. 472
Establishing a Gas and Fuel Testing Laboratory at Vienna 476
Gas Shareholders on a Lighting Committee . 480
Sheffield and the Handsworth Water Supply —Successful Water Divining 487
Reduced Price of Gas at Seaford 488
Conviction for Illegally Tapping a Gas-Main —Damage Done by Smoke — Additional Capital for Mitcham and Wimbledon Gas Company—Salford Corporation Finances—Crewkerne Lighting Dispute Settled . . 489
Wages Question at the Rochdale Gas-Works—Management of the Colwyn Bay Gas-Works —Exmouth Water Supply—Cost of Lighting in Ireland—Torpoint Water Supply—Unprofitable Electric Lighting at Sleaford. 490
New Joint-Stock Companies—Lord Avebury on Municipal and National Trading—Tiverton Public Lighting—Gas Poisoning at Cambridge—Assessment of the Woking Water Company 491

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VOL. CVIII., No. 2427.—TUESDAY, NOVEMBER 16, 1909.

EDITORIAL NOTES—GAS, &c.

The Uneconomic Object of Municipal Service.

As President of the Manchester Association of Students of the Institution of Civil Engineers, Mr. J. G. Newbigging, the Chief Engineer of the Manchester Corporation Gas Department, in his Inaugural Address last Wednesday, grasped an opportunity for impressing on those members whose work will be cast in other branches of engineering the dignified and important position occupied by the gas industry, and at the same time scattered among them the seeds of the correct policy in the administration of the affairs of municipal trading concerns. In every part of the structure of the address are seen that independent thought, that enthusiasm for profession and industry, and that broad-minded toleration for the views of others while defending individual opinion, that have been, and are, the recognized characteristics of the venerated personality that has taken such prominent part in the making of the industry's history. It is a great history, full of progressive work, and yet not without its darkened periods. The students who had placed before them the remarkable statistics of development, in the face of a strenuous opposition with at its back all the favour bestowed by the human love of novelty, will carry with them in their divers professional walks, through Mr. Newbigging's address, a greater esteem than possibly they would otherwise have possessed for the branch of the profession represented by gas engineering. Their eyes were opened to the vast field offered by the industry for the exercise of professional talent, to the immense financial responsibilities shouldered by the gas profession, and to the infinite service rendered by the professional work to the community in all its private, trading, and industrial circumstances. There has been much said in the past about keeping up the end of the gas industry in public recognition; and for taking and seeking for opportunities of doing so. An opportunity came to Mr. Newbigging; and he, as will be seen from his address, took it, and did his part well.

The opportunity was also taken by the President to make it quite clear that his sympathies are altogether hostile to the policy of appropriating the profits of municipal trading concerns in relief of the rates. It was a courageous stand on the part of a Chief Gas Engineer of a Corporation who have dipped so deeply and notoriously into the coffers of their gas undertaking to subsidize their administration of civic affairs the cost of which should be discharged in legitimate manner on terms of equality. But in this the President has with him that old campaigner on this question, his Chairman (Alderman Gibson), and the other members of the Corporation Gas Committee, as well as professional opinion, with a few exceptions, throughout the industry. The instinct and deliberate desire of the truly professional man placed in a sphere combining so many obligations and responsibilities as those of a gas engineer and manager, are to do the best possible for the concern and the capital with which he is entrusted, and for those whom the undertaking is destined to serve. This instinct and deliberate desire are strong within Mr. Newbigging; and therefore he is out of harmony with all municipal policy (such as profit appropriation) that imposes any restraint on him in serving the undertaking, and its patrons in degree great or small, to the highest advantage. The declaration is not incompatible with the President's position as a municipal officer. On the contrary, it indicates a strong fidelity to the interests that he is called upon to serve to the utmost of his ability; and that is just what Manchester looks for in, and expects from, their chief officers. With him the doctrine inculcated and believed, as underlying true municipal enterprise, is economic service. The sole motive of municipal trading of whatever description should be service at the cheapest possible rate; and that alone can justify such trading. All other considerations only supply amplifying borderings to the controversial question. It is not, for instance, sufficient to say in regard to gas supply that relatively to the majority of towns the consumers are only charged what may be regarded as a fair figure for the service rendered, when, without profit appropriation, partly applied to benefit those who have not contributed to the making of the profits, the service might have been given at a much lower price.

The most economic gas service has not been the policy at Manchester. Good and economic administration has obtained within the Gas Department; beyond it a superior power has annihilated much of what has been done within to give to the citizens the gas service at the lowest possible price to which they are entitled, and which it is to the interests of the whole city they should have. The total quantity of gas consumed in Manchester between 1844 and 1909 could have been sold at prices producing £2,918,585 less, had the Corporation not taken this sum from the gas consumers to be devoted to purposes the liabilities in connection with which should have been discharged through the ordinary powers of direct rating. The sum named as having been appropriated is more—mark this!—by £136,950 than the total expenditure on manufacturing and distributing plant. Though the total expenditure on plant has been £2,781,635, the total liabilities to-day only amount to £1,515,275. The difference has been provided by the gas consumers, the works and plant have been maintained by them, the whole cost of administration has been borne by them, the ordinary rates and taxes to which the undertaking is subject have been paid by them, and upon all this £2,918,585 has been taken from their pockets for purposes foreign to the administration obligations and service of the gas undertaking. It is wrong; and what is wrong is not honest. The figures and considerations drive into a corner those who, with parrot-like reiteration through brevity of reason, give utterance to that pusillanimous excuse as to the responsibility of the ratepayers for the capital. For any such hypothetical responsibility the ratepayers of Manchester (*quâ* ratepayers) have been well paid; and they are, in effect, the debtors now of the gas consumers for the remainder of the capital liabilities, and the difference between this sum and the £2,918,585. In other words, the responsibility has been discharged by the gas consumers having placed in the hands of the ratepayers more than sufficient to liquidate all the gas loans. That is what, in common sense, it amounts to when there is talk of the ratepayers' responsibility. Supposing (regarding the matter from another point of view) all this money that has been appropriated for the rates could have been legitimately allowed to accumulate at compound interest, the capital debt on the undertaking would long since have been extinguished; and at what price then could gas have been supplied to present-day consumers? This, admittedly, would not have been fair to past consumers, who have had as much right to the most economic service as the consumers of to-day.

There has never been a valid argument for profit appropriation as has been witnessed on the high scale at Manchester; and those grey-with-age arguments that only had plausibility as a recommendation have not now for support—in view of the figures advanced by Mr. Newbigging—even the shadow of the original character that gave them passing acceptability. The best thing that Manchester can do is to cry "quits" as between ratepayers (as ratepayers) and gas consumers (as gas consumers), and let the policy of the future be that fullest economic service—a service which would bring in its train other advantages than the one of cheapness—that will do much to repress the resentment that has been created in respect of the municipal conduct of gas undertakings. If there is not voluntary relinquishing of this policy of profit extortion, it is certain that Parliament will not permit it to go on everlastingly. The Salford and Oldham Bills in the current session of Parliament herald the warning; and, in the opinion of Mr. Newbigging, the withdrawal of the Salford Bill was not in the best interests of municipal gas enterprise. The Bury Corporation have taken the voluntary course. At their own instance, they

have this session brought themselves under an obligation to divide equally any excess gas profits between the general fund and the consumers of gas, while the gas undertaking is to repay to the general fund any deficits that may henceforth be made good from the fund. This is another form of control, though rather more loose than that proposed in the case of Salford and imposed in the Oldham Act. However, there is plain speaking in the President's address; and, indeed, it incorporates one of the most cogent cases that have ever been submitted for reform. And reform is requisite. In a very short time through it, Manchester could be supplied with gas at a uniform rate of 1s. 6d. per 1000 cubic feet; and there is a large undeveloped field of usefulness lying around for gas at so low a price. Given the one essential of greater cheapness, the President foresees in the future of the gas industry a more conspicuous utilitarian success than ever it has yet attained. This subject of policy and service is only one of several in an address packed with illuminating interest.

The Gas Workers' Strike in Italy.

THOSE who have read in the "JOURNAL" columns of the fateful struggle that is proceeding between the Union des Gaz (with the Continental Union Gas Company) and the men in their employ at the Italian stations, will be disposed to be heartily thankful that their lot is cast in places where the workers are animated by a greater reasonableness. In other columns, we have endeavoured to review the situation as dispassionately as the extraordinary demands of men already endowed with exceptional power as employees will permit. They are now out on strike hoping to imperil the gas supply of Milan, Genoa, Alessandria, and Modena to enforce their most remarkable claims; while the Company, recognizing the vital issues involved, are rightly resisting—and successfully, we are pleased to say—the attempt that is being made to cause them to finally surrender such liberty of control as they now possess in regard to labour, and to take upon themselves additional financial burdens which, under the conditions subsisting between them and the towns supplied, would considerably reduce the barely fair compensation now received for the service and character of enterprise in which they are engaged. In their resistance so far, there has been success; and the sympathy and best wishes will go out to the Company and to their executive officers—particularly Mr. Clement Hovey, the Chief Engineer at Milan, and the General Manager, Signor Grüss, upon whom has fallen, with the Consulting Engineer, Mr. A. F. Phillips (who is a Director), the burden of active participation in the conflict, through which, at the time of writing, they have not by any means completely passed. The Company and their officers were prepared for the tussle. The clouds that have been gathering for some time past warned them that it would not be long before they burst, and burst they have with violence. There have been anxious times the last fortnight at Milan; and the claims on physical endurance have been great. But the citizens (and the same may be said of other places) have suffered the minimum of inconvenience. Full credit and congratulation for this to the loyal executive staff, and to those workmen—British and of other nations—who went out to help (with willing Italian workmen) to resist the tyranny of the labour extremists who were responsible for the singular demands presented to the Company's Directors. The Company must not give in; and they will not do so while they are so well supported by officers and men, both faithful and honest.

The difficulty is to regard temperately the demands of the men that have resulted in the fight now proceeding. Upon those demands, it would be idle to attempt to negotiate terms; for only men bereft of reason and all sense of integrity could have preferred them. They ask, in the name of justice, for the exorbitant this, and the impossible and impracticable that; but where in any one part of their demands has justice swayed the men? We fail to put a finger on any one part. They eschew arbitration; they want to have the power of selection of the men, and of decision as to the number of men, to be employed conferred upon them; they want the right to determine questions of labour expediency; and to have referred to their judgment all proposals for dismissal through incompetence or other cause. They are to be, or rather they desire to be, the sole arbiters as to employment in connection with the Company's works. Increased wages are desired, and additional help to do the allotted work, as well as an augmentation of wages after 21 years' service. Besides the weekly rest day, an annual holiday, with full pay, of 24 days is required. There has been a large increment of personal advantage to the men in the past, while the work has yearly been made easier. The imagination, inventiveness, and selfishness that these extremists have brought to bear on their demands must have displaced all common sense; and certainly there can be no sense of honour among them. They are now seeking to enforce their claims by rebellion against law and order; and between them and the Company's property the authorities have had to interpose very necessary military protection, and this upon a somewhat large scale. These strikers are the men on whom the Company have showered concession and consideration. Equal pay for less work than in this country; and all the benefit funds, pensions, holidays, and so forth—just as are found at home. But all to no good. The men are irresponsive to it all. If anything, the more they receive, the more they want. Success in one appeal spurs them on to ask for still more. In this attempt to reverse the common order of things—the employee controlling employer, and making exactions that cannot be borne—we have the maturing fruit of socialism. The attempt must not succeed. The duty of the Union des Gaz and of the Continental Union Gas Company, it is clear, is to stand firm, at whatever financial cost; and the proprietors must support the Boards. The issue of this struggle is vital to the future of the Companies as commercial concerns.

Paving the Way.

DEALING last week with certain technical questions raised by the paper by Mr. J. H. Coste, F.I.C., on gas calorimetry, read before the London Section of the Society of Chemical Industry, there was one general point that was reserved for separate reference. It is the almost (if not entire) universal agreement that exists among the chemical specialists identified with the gas industry as to the illuminating power standard for gas being of practically no moment now, and a calorific power standard being a fit and proper substitute. The recognition of this extends to the Chemical Department of the London County Council, under whose charge is the gas testing of the whole of the Metropolitan area, other than the City. This recognition is no less pleasing than significant. Some months ago Professor Frank Clowes, the Chief of the department, writing in "The Times," spoke of the restricted importance nowadays of the illuminating power test, and of the rising importance of calorific power, and referred to the probability of calorific power being the future standard for gas. In precisely identical terms, his chief assistant (Mr. Coste) wrote in his paper; so that we may look hopefully to the London County Council, in due season, lending a hand to remove the shackle of the illuminating power standard, and (as Parliament is bound to insist on some standard in substitution) in setting up a reasonable calorific power one. The gas industry and the business of gas supply have been for some time ripening for the change. The President of the Institution of Gas Engineers (Mr. James W. Helps), during the discussion on Mr. Coste's paper, pointed out that, if gas undertakings had a calorific power test, instead of an illuminating power one, they would be satisfied; and he further said that, in his opinion, it would not be long before the gas industry had a calorific power standard substituted for the present one. Dr. H. G. Colman hopes that the day of the change of standard may come soon; and Mr. W. J. Dibdin (Professor Frank Clowes' predecessor at the London County Council) says that the time for change has already arrived. There is no question that this paper and the discussion have lent a hand in helping forward the change.

But there is something to be done before the change can be brought about. It is recognized by all who are qualified to pronounce an opinion upon the matter, that no common standard for calorific power can be applied, nor that from the indications of illuminating power tests can the calorific value of a gas be assessed. This was made abundantly clear in the paper and the discussion, as was also the point that it is possible, by variations of manufacturing process, to degrade illuminating power and improve calorific power. This being so, it is imperative that gas authorities should commence at once the systematic testing of their gas for calorific value, as was done for three years in the Metropolis before the Gaslight and Coke Company consented to be placed under a penal calorific test; the official informative testings being still carried on in the areas of the other two Companies. As Mr. Coste says, it is quite clear, from investigations that

have been made, that no standard for calorific power can be satisfactorily fixed for any supply, unless the gas is thoroughly tested and determinations of the calorific power are made over a period. The present is the time for such preparation; and, through the calorimeter, the technical staff of every gas undertaking should bring themselves into contact with all the lessons that are to be obtained from its use in connection with the gas produced day by day under the special conditions of the concern. The President of the Institution believes that it will not be long before every gas authority—company or municipal—will be using calorimeters to a much greater extent than in the past; in fact, it will be absolutely necessary for them to do so. For its own information and protection, every gas undertaking must do its part in paving the way. The calorific test is inevitable; but it must only be by supersession of the present standard, for between the two there is no real affinity. Sooner or later the parliamentary authorities will take up the matter through the repeated attention bestowed upon it; and it will be well for every gas undertaking to thoroughly understand its own position.

Suggestion for the Refractory Materials Committee.

In a communication elsewhere in this issue (p. 464), Mr. W. R. Herring supplements the interest that has been aroused on the question of the relative virtues of fire-clay retorts of British and German origin. It is not the first time that our correspondent has dealt with the subject of the life of retorts; but on this occasion the matters under consideration are on different lines. From a wide experience, Mr. Herring is confident that retorts at least fully equal to German manufacture can be procured from "a few" British makers; so that he is not disposed to admit the apparent hopelessness of the position so far as British retorts are concerned. The employment of the expression "a few," and the succeeding admission that "there is *considerable* room for "the application of methodical scientific methods in the pre-"paration of fire-clay goods for the many different purposes "for which they are now used," are sufficiently expressive to show that there is lurking somewhere in the writer's mind the feeling that all is not so well with the methods of the British fire-clay industry as it might be. The rectification is entirely in the hands of the fire-clay makers themselves. Like Herr Körting last week, our correspondent this week thinks that the weight of censure that has been placed upon the retorts should possibly be spread over setting design and the materials other than retorts used in the settings. The treatment of the retorts, and the weight of coal carbonized in them, should also be taken into account. The quantity of coal carbonized in retorts, of course, affects their lives just as much as the amount of coal passing over the belt of a projector affects its life. Engineers have been heard to speak of the greater number of days' work they get out of their projector belts in comparison with other works, forgetful that at the other works the quantity of coal dealt with every day may be two, three, or more times greater than in their own works. Mr. Herring puts his finger upon certain weaknesses and influences that he considers affect the life of retorts apart from their own constitution. Herein he supplies a sufficiently strong case to show that, as Herr Körting also submitted last week, there are insufficient data available as to the causes affecting the durability of retorts for any fair and accurate judgment being arrived at on the matter. In this respect, our correspondent is of opinion that the Refractory Materials Committee of the Institution of Gas Engineers could usefully enlarge the sphere of their operations. Perhaps they will take the suggestion into consideration. Certain it is, that many gas engineers would be willing to render assistance in filling the complained-of gap in the requisite data.

Novel Prepayment Methods.

In this country, prepayment gas methods have settled down on a bed of principles that are much the same in every city and town; and therefore it will be refreshing to our readers to consider the article by Herr Kobbert, of Königsberg, published in other columns, on the subject of the "Economic "Aspects of the Slot-Meter System." We are afraid the day has passed, owing to the already large adoption of the prepayment system in this country, when some of the almost revolutionary methods advocated by Herr Kobbert could be applied. But still there are places where the question of expediency could be put to the test on a tentative scale. There are two fundamental points that have to be grasped in considering the contents of the article—the one being that it is now generally recognized in Königsberg that gas is the fuel of the people of small incomes, and that experience has led to the conclusion that the economical value of the prepayment meter lies chiefly in the method of payment which allows the consumer to reckon up exactly his expenditure on gas. In both respects, there is a reversal of British notion and custom. It has not yet been generally recognized by gas men here that their primary product is a heating fuel for people of small means, other than for cooking; but the idea is unquestionably growing with an increasing economy in the application of gas as fuel. Nor, to be frank, is it commonly considered advisable to be constantly reminding prepayment consumers of the amount they are spending on gas. Sufficient is it that they are content, at the time they deposit their pence, to pay for the comfort and the convenience.

Herr Kobbert uses the prepayment system, in conjunction with a price lower than that charged for lighting, with splendid effect in developing the gas-heating business. But his prices for gas are high in comparison with the general run of charges in this country. The high lighting price appears to compel recourse to some such system as that described. That it is successful, the figures given in the article attest. For while the ordinary meters for lighting have been nearly stationary the last few years, and the slot meters for lighting have only reached a numerical strength of 2370, the ordinary meters for gas for cooking and heating have nearly doubled (being now 6619), and the slot meters for cooking and heating have mounted up from 486 to 14,178. This is a remarkable showing; but the duplication of the meters and piping must represent a large capital cost, and the meter inspection and collection, together with the clerical work, must also involve additional working expense. There is not much interest in the figures Herr Kobbert gives as to the increase of gas consumption per head of the population; seeing that population is not a stable base for comparison.

The lower flat-rate prevailing in this country for gas for all purposes would, we are afraid, put Herr Kobbert's system to a large extent out of court; but we are not sure that a differential price, with discount meters, would not be beneficial in more ways than one in giving a fillip to the heating business, and indirectly be of assistance to the lighting business. A lower price than the ordinary is always seductive, and influences trial, for a new purpose; while the separation of the lighting and fuel accounts would be of great advantage in exhibiting the real smallness of gas lighting bills. It is not (though it is difficult to avoid it) to the benefit of the gas business in the competition with electricity that the gas accounts should show in one item the consumption for all purposes, while the electricity account only shows the cost for one purpose. However, we do not think Herr Kobbert's plan is the most economical one for effecting differential charges. On the other hand, the figures show the vast difference that exists between the consumers using the gas for lighting and those using it for heating and cooking—the latter, including both ordinary and prepayment, exceeding the former by no less than 12,456. This is certainly remarkable; and therefore one hesitates to suggest that Herr Kobbert, under his special circumstances, has not taken the most prudent course. The big number of slot meters in excess of the ordinary for heating and cooking also indicates that the system of prepayment has helped to create the extraordinary showing. We will not enter into the details of the practices at Königsberg in relation to the slot-meter system; but readers will not overlook that preference is given there to the collection of sealed slot-meter money-boxes rather than of the money in the boxes. This novelty furnishes part of the interest to be derived from a perusal of the article.

The Gas Companies' Joint Standard Burner Bill.

We are informed by Mr. Fred E. Cooper, the Secretary of the Gas Companies' Protection Association, that up to midday yesterday forty-eight Companies, representing between them an annual make of gas of about 20,500 million cubic feet, had signified their intention of joining in the Bill which is to be promoted in the next session of Parliament to authorize the substitution of the "Metropolitan" argand No. 2 burner for the burners now used by the different undertakings that may be associated with the measure. There is thus ample assurance that the Bill will be a powerfully supported move in the direction of clearing away a

state of affairs which it is generally felt imposes great hardship on the gas undertakings to which it applies. The accession of Companies since the last issue of the "JOURNAL" went to press is most satisfactory; but we are hoping that, when the matter is finally put into shape, it may be found there are some further additions still to the list of names of undertakings joining in the promotion.

Construction of Unauthorized Works—The Barnet Case.

As briefly announced in the "JOURNAL" last week, the Barnet District Gas and Water Company have been successful in their appeal against the decision of Mr. Justice Ridley in an action brought by the Attorney-General, on the relation of the Marquis of Salisbury, to restrain them from sinking a well at Colney Hatch, on the ground that they had no power to do this. It was submitted on behalf of the Company that their Act of 1904 conferred the power; but it was argued on the other side that all they had authority to do was to take water from the authorized works shown on their deposited plans. If, in connection with these works, and ancillary to them, they wished to sink a well, they had a perfect right to do so; but they were not entitled, because they had power to purchase land by agreement, to obtain some in any part of their district, and sink a well there. As the well in question was 6½ miles from the nearest authorized works of the Company, it was submitted in the Lower Court that its construction was *ultra vires*, and that the case was governed by the Frimley and East Grinstead cases. Put shortly, the question before Mr. Justice Ridley was whether Parliament had or had not authorized the carrying out of the particular works he was asked to stop; and his Lordship decided that it certainly had not. Before the Court of Appeal, it was contended by Sir Alfred Cripps that, in the construction of the section of the Company's Act bearing upon the question, the principle of the Frimley case—viz., that Parliament did not give a water company a roving power to construct a well anywhere they pleased, but only to carry out the works authorized—was decisive, and that Mr. Justice Ridley was right in granting the injunction. On the other hand, Sir Robert Finlay submitted that the circumstances of the two cases were entirely different. He showed that under the appellant Company's earlier Acts they sank wells; and he argued that it was inconceivable that when, in 1904, the Legislature found that this had been done, and passed a Bill which reproduced the authorizing language of one of those Acts, they did not intend to permit the Company to do similar work. The learned Counsel's contention, however, received the approval of only two of the three learned Judges before whom the appeal was argued—Lords Justices Buckley and Kennedy; Lord Justice Vaughan Williams holding that Mr. Justice Ridley was right in regarding the Frimley case as a precedent for deciding the one before them. It is unfortunate that their Lordships were not of one mind on the question; but the fact only shows once more how difficult it is, even for those who are "learned in the law," to construe the language of Acts of Parliament. The decision in the Frimley case was as disturbing in its effects as that given some years ago upon the "annual value" question, at the instance of Mr. Dobbs, inasmuch as it has necessitated, as our columns have shown, applications to Parliament for the confirmation of works carried out, as was generally supposed, under legislative sanction, but for which, as it now appears, no such authority had been given. As the Barnet case will, in all probability, go to the House of Lords, further reference to it may be left. Meanwhile the Company can go on sinking their well; but they must not draw water from it if this is likely to be detrimental to the district.

More Revelations.

Among the wreckage of the flotations of the Eaton promoting gang is the Rawcliffe (Yorks.) and District Gas and Coke Company, Limited, a meeting of which was held last Tuesday. In this instance, the vendors—Eaton's Water-Works, Lighting, and Power Investment Corporation—have not, through the public being unappreciative of the benefits to be secured from what Eaton himself confesses is only a patched-up rotten gas-works, been able to squeeze much financial advantage from it, though the expenditure incurred in obtaining a small amount of capital was heavy. In connection with this capital-getting, it is interesting to learn that there is not a single opening that is missed through which Eaton and his associates can extract some monetary benefit. It has always been known that the lists of shareholders of reputable gas companies that this promoting gang obtain are used for circulating prospectuses; but, according to a Rawcliffe shareholder, one of the Eaton concerns through which operations are conducted, charges the promoted companies for lists of the names of likely shareholders. In the case of the issue of the Rawcliffe prospectus, it is understood that a list, consisting of about 60,000 names, was supplied and charged for at the rate of 50s. per 1000, or £150 in all. How often, we should like to know, has the same list been sold in similar manner to other promoted companies? The Act giving the power to shareholders to obtain lists of their fellow-shareholders never contemplated that they would be used for traffic in this way. From the report that is published in other columns of the proceedings at the Rawcliffe meeting, it will be gathered that there was much trivial speaking on the occasion. It is also seen that the same old haziness that has been found surrounding the Ticehurst and other concerns of this particular parentage, has been carefully cast around the proceedings of the Rawcliffe Company by those interested in concealment; but, through the report, the delinquencies of those responsible are open to the light of day. Therein is the only justification for the publication of a report of the extraordinary length (for such a Company) to which we have gone this week. Among other points brought out—and we are glad to see this—it is clear that this particular Company and others of the same group have become pariahs in the commercial world. Many trading firms, despite warnings, have entered into business relations with these Companies. But once bitten, twice shy. The report presented by the Directors at the meeting was not adopted. In our view, the best thing the shareholders of these concerns can do is to appoint some gas engineer of recognized standing to make a thorough investigation of their affairs. But the man appointed must not be one of Eaton's nominees, but someone of good reputation in the gas industry proper, and not in that section represented by the undertakings of parasitical company-mongers.

Brockenhurst Again.

Witness has been borne by our columns lately to the fact that the St. Stephen's Chambers group of promotions are restless again just now—more money being required in various quarters. Only as recently as June last, the Brockenhurst Gas Company (upon the directorate of which are names—Philpott, Capes, and Brown—that are now getting greater publicity through appeals for capital than they at one time received) were out with a prospectus. Well within six months, the Directors issue another, offering a further 250 shares of £10 each, ranking for dividends up to 10 per cent. Printed in red at the top of the prospectus is the usual "sprat": "Six months' interest at the rate of 6 per cent. per annum will be paid to the purchasers of the undermentioned shares on the 7th December, 1909 . . . in accordance with the guarantee hereinafter referred to." On the face of the prospectus are also the words in red ink: "Six months' accrued interest, payable 7th December, 1909." As this prospectus is largely composed of matter appearing in the one previously issued, readers may be referred to the comment passed upon the concern in our issue for June 15, p. 696. By the way, Mr. A. F. Painter never complied with the request made on that occasion. That is unkind of him.

The Westminster Technical Institute.

Last Friday evening, between fifty and sixty of the students in the Gas Supply Classes of the London County Council Westminster Technical Institute visited the Essex Street compressing station of the Gaslight and Coke Company for the purpose of examining the plant used for the high-pressure lighting of Aldwych, Kingsway, and Fleet Street. Full explanations of everything to be seen there were offered by Mr. G. Dodimead, the Chief Lighting Inspector of the Company. After seeing, and duly appreciating, the lighting installations, a move was made by the party, who were accompanied by their tutors (Messrs. J. G. Clark—who takes the advanced class—P. Smithers, H. Rothwell, and Bevis), to the Tudor Street valve-room, where their guides made them fully acquainted with the system of governing the gas which is driven from Beckton. The proceedings closed with a hearty vote of thanks to the Gaslight and Coke Company for permission to make the visits, and to the tutors for accompanying the party.

Mr. W. J. Smith, who recently took up his duties as Gas Engineer to the Bolton Corporation, has been elected a Vice-President of the Bolton Municipal Officers' Association.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 484.)

THE Stock Exchange has not had at all a cheering week. Though an improved gold position relieved the monetary strain, Consols and their class were heavy, and closed decidedly flat. Some of the speculative lines had a bad time. The brightest quarter was our Railway Market. Business on the whole was very quiet and sensitive to light influences; and the feeling in general was disposed towards gloom. It was account week. The adjustment was not a heavy affair, but one small failure was announced. The opening on Monday did not augur well for any one market, and depression prevailed throughout all. Tuesday was a more cheerful day for most of them. Consols rose $\frac{1}{8}$; and Railways began a steady recovery, which lasted fairly through the week. Business was far from active on Wednesday. The higher class departments were steady; but there was a good deal of jumpiness about the speculative lines—such as South Africans and Mines. The position of things remained much the same on Thursday, with further weakness in those which had given way the day before. Business fell very quiet on Friday; all markets being inanimate and dull. Consols lowered $\frac{1}{4}$; and Railways lost some of their rise. This state of affairs continued on Saturday; and Consols had a further fall. In the Money Market, there was a good demand, and rates for short loans stiffened up nicely for lenders. Discount rates, after some little unsteadiness, moved downwards. Business in the Gas Market was much on a par with the week before—*i.e.*, below a fair average rate of activity. Changes in quotation were irregular—about as many one way as the other. The losers were the secured issues of the Gaslight and Coke and the South Metropolitan Companies; and, as a corollary to the former, West Ham secured issues went with them. But several issues, widely distributed, advanced; Ilford being conspicuous with a large rise. Transactions in Gaslight and Coke ordinary ranged from 102$\frac{3}{4}$ to 103$\frac{3}{8}$; in the maximum, from 87 to 88$\frac{1}{4}$; in the preference, 104 and 104$\frac{1}{4}$ were marked; and in the debenture, 83$\frac{1}{4}$ and 83$\frac{3}{4}$. South Metropolitan was very quiet, changing hands only about four times at figures ranging from 120$\frac{1}{2}$ to 121$\frac{3}{4}$. The debenture was done at from 82 to 83$\frac{1}{2}$. In Commercials, the only transactions were two in the 4 per cent., marked at 110 and 110$\frac{1}{4}$. In the Suburban and Provincial groups, Brentford old was done at from 255 to 256, British at 42$\frac{3}{8}$, Ilford "A" at 145 and 145$\frac{1}{2}$, Portsea "B" at 129$\frac{1}{2}$, ditto "C" at 120$\frac{1}{2}$, South Suburban at 120, and West Ham debenture at 108. In the Continental companies, Imperial was done at from 180$\frac{1}{2}$ free to 182 *cum div.*, and from 176$\frac{1}{2}$ to 178 *ex div.* Union realized 97$\frac{1}{4}$ and 98$\frac{1}{4}$, and European fully-paid 24$\frac{5}{8}$. Among the undertakings of the remoter world, Buenos Ayres changed hands at 13$\frac{1}{2}$ and 13$\frac{5}{8}$, ditto debenture at 96$\frac{1}{2}$ free and 97, Hong Kong at 17$\frac{7}{8}$ and 17$\frac{1}{2}$, Primitiva at 7$\frac{1}{8}$, ditto preference at 5$\frac{1}{4}$, and River Plate at from 16$\frac{1}{2}$ to 16$\frac{3}{4}$.

ELECTRICITY SUPPLY MEMORANDA.

The Suppression of the Carbon Filament—Metallic Filament Lamps in Street Lighting—Insane Costs—Inefficiency Testimony—Allowance in Price for Waste—Hiring and Wiring.

FROM the early days of the incandescent gas-lamp, electricians sought by queer devices to maintain that electricity was cheaper than gas; but, if we are to believe what is now being said, the metallic filament lamp only came along just in time to save from total destruction the lighting business of the electrical undertakings, in places where people want a cheap bright light. Now that the metallic filament lamp is with us, there is talk in electrical circles of the unsatisfactory lighting and costliness of the carbon filament lamp; so that the proclamations of old were false, and wittingly so. The failing in this respect has become a kind of second nature with some of the electrical fraternity. We no not know why it should have been necessary, in admittedly an uphill fight, for them to have sought the aid of obliquity. But so it was; and the habit sticks. Carbon filament lamps are, excepting where retained for decorative purposes, fast finding their way to the scrap heap, or to the dustbin. A statement at the recent meeting of the the Edison-Swan Company is illustrative. The Company's carbon filament lamp sales show a decline of 6 per cent., and in value of 17$\frac{1}{2}$ per cent. Thus it is not to be marvelled at that the Edison-Swan Company have entered upon the manufacture of metallic filaments. It is a matter of life or death with some of the carbon filament lamp makers; and wisely they have decided that there is no use in trying to swim against the tide. Continuance of that game is sure to end in fatigue and collapse. So they are going in unison over to metallic filament lamp manufacture; reducing their output of the old form of incandescent lamp as the demand shows signs of decline. But the chances are that the makers will not do so well out of the new lamps as they have done out of the old—that is to say, the largely increased cost of manufacturing the metallic filaments compared with carbon filament lamps, combined with the clamour of electrical engineers for still cheaper metallic filaments, will have an effect in whittling-down profits. The metallic lamps are also producing an adverse effect on the arc lamp business. Several electrical engineers are turning out the arc lamps in the streets, or have determined to limit them to main roads; replacing the evicted arcs by high-power metallic filaments, on the ground that they are lower in initial cost, in replacement expense, and in annual running outlay, but they say nothing of the lower efficiency. Very little, too, is said about the expense of maintenance for street purposes; but more is heard of this from private consumers. Just before this paragraph was written, in conversation with two users of metallic filaments, one of them stated that he had just had to fix two new 50-candle power lamps and the other owned to having replaced four, which had "gone" simultaneously one evening, though running "quite brightly" just before. The replacement of these four lamps cost this consumer 17s.; and, failing to see that there was much in the talk as to consumption saving when a bill of this kind dropped on one, he did not forget to talk about the matter. Mr. A. C. Cramb, the Electrical Engineer of Croydon, has lately been writing on this subject. He thinks the price of the metallic filament lamps is too high. "From some cause or other," he says, "a lamp breaks; and a consumer is asked to pay out 4s. 3d. for a new one. The result appears to be that, instead of having a satisfied consumer, the gas company is more likely to obtain an addition to their number."

We have lately had to comment on the question of public lighting—in particular, pointing out that, where electricity undertakings are in the hands of municipal authorities, they spend heavy sums in converting the street lamps to electric lighting, without any care as to whether the ratepayers are going to really obtain benefit from the change. In places, too, annual inclusive prices are quoted by the electrical department without any calculation as to whether or not they are paying ones. Prices per unit are in some cases quoted for the current that are below, or perhaps only equal to, works' costs, without taking into account any of the capital and administrative charges; and the haphazard system has also found favour of offering to do the lighting at the same price per lamp as the gas lighting, without regard to whether or not it will pay. These are treated as small matters so long as the lighting is removed from the control of the detested successful gas company. Epsom only reflects many other towns in respect of indifference to financial and other consequences. There Mr. H. Ross Hooper, of the Local Government Board, finds that the District Council have been carrying on a system of lighting without even knowing the cost. "There has been a loss," he recently remarked at an inquiry in the town, "on both the public and the private lighting; and the position in regard to the former is that the price charged has never been worked out." It would not be so bad if this were an isolated case; but unfortunately it is not. This sort of thing only shows the strength of gas in public lighting, given a fair field and no favour, and if competitive terms did not mean losing terms for electricity. It was only the other day that the Electrical Engineer of Dundee was complaining that he was driven to competition, for "if ever he got anything, he had to fight hard for it against gas." His idea of competitive terms is, in the case which gave rise to his plaint, to quote £9 each for 16 flame arc lamps, which he asserts will give 3375-candle power apiece! He might just as well have made it 30,375 candles while he was about it; for one may as well be spiked for a big as a little thing in these matters, if spiking there is to be. The total cost of his 16 flame arc lamps per annum was to be £144; and the reputed aggregate candle power 54,000 candles! The City of London Companies have not yet—inflated as have been their claims—gone to the length of the Dundee Engineer. For this lighting the Gas Department quoted £156 for 31 lamps of a total of 11,000-candle power. And we venture the opinion that, for efficiency and uniformity, these 31 gas-lamps would have been, despite the electrical candle power claim, much superior to the 16 flame arc lamps.

However, arc lamps are not in strong favour just now for street lighting; and metallic filament lamps are having an innings. The Hastings Corporation have put some up in one of their thoroughfares, in which a good contrast can be made of their efficiency and that of ordinary incandescent gas-burners. That was a diplomatic fault on someone's part; for already letters have appeared in the local papers (as mentioned in our "Miscellaneous News" last week) complaining that the spending of the ratepayers' money has produced something less efficient than they had before. Mr. Angelo Lewis says that "no one ventures to say the new light is better than the old one—indeed, anyone with eyes in his head can see for himself that it is far poorer." That is the opinion of a man who appends his name to the view he expresses. He also speaks of the diffusive power of the metallic filaments as demonstrated to be less than that of the incandescent gas-lights. Another correspondent says the result of the lighting is a lamentable failure; the lighting is distinctly worse than before. This is what was proved by the Beckenham experiment [see "JOURNAL" for Jan. 12 last, p. 93]. Then what are ratepayers getting for the money that the Corporation have spent in commencing this conversion of the public lighting, without the consent of the Local Government Board? And what is the electricity undertaking gaining? What, too, becomes of the boast made in the local papers regarding the wonderful things that the metallic filament lamps were going to do for the electrical undertaking? For it salvation was once going to be obtained through the flame arc lamp. But the flame arc did not come up to the scratch as a redeemer. Then the metallic filament lamp was going to do the trick. The loss on the concern last year was £3801! As we have said before, the current attention that is being bestowed on the question of public lighting is due partly to

the action of the local bodies in favouring at any price which they think will excuse the change the conversion of the street-lamps, possibly believing that some ulterior advantage will accrue to their electrical undertakings; partly to the advances in inverted gas-lamps; and partly, again, to the gradually descending prices for gas. The two latter causes have apparently caused Mr. W. A. Jackson, Engineer of the West Bromwich Corporation Electricity Department, to abandon hope. Writing to a contemporary recently, he asserted that it is not possible to develop street lighting in West Bromwich by means of metallic filament lamps, owing to the fact that gas is sold for the purpose at 1s. per 1000 cubic feet. Energy is chiefly supplied there for traction and power purposes; but lighting in competition with cheap gas and inverted mantles is becoming a secondary matter. The inverted gas-lamp has given the electrical industry a shock; but it is not out of place to mention here that, in recent travels, we have seen some ugly examples of shop inverted lamps, which will do gas lighting no good. The circumstances under which they were fixed and are maintained are not known to us; but where there are such lamps, gas managers should see what can be done to remove something that is distinctly against the interests of their undertaking, and substitute it by something that is creditable and sightly.

We like originality and truth. The combination is found in some of the writings of Mr. R. Borlaise Matthews. In two places in the last batch of "Central Station Commercial Notes" in an electrical contemporary, the unity of the two qualities is found. We must first point out what leads up to the point that has specially attracted attention. The question of rates for heating and cooking and for minor devices in which heat is required is being discussed. The difficulties of the situation are shown. The great thing is to get the appliances tried; and then there must be "careful nursing" to ensure that the apparatus does not fall into disuse. This shows the ticklish job that overhangs the perpetuation of use. Then with high prices, "one of the things that must be carefully pointed out is that the waste of current is to be avoided, and also that it does not do to leave the appliances in the hands of servants, or else the bills will be high." Then at special power and lighting rates of 2d. or 2½d. per unit, the veracious Mr. Matthews asserts, "any electrical appliance, even an electric oven, can compete with other methods of heating and cooking, if *great care* is taken to avoid waste of current." Can compete! In a previous budget of notes Mr. Matthews was talking about the deficiencies of electric ovens and temperatures (*ante*, p. 382). But at these prices the wonderful economical electricity is only competitive for heating and cooking with other systems when, we read, it is under the direct control of the mistress of the house, or where the servants are extremely careful. Cheaper rates are, however, essential; for with all the "careful nursing," "great care," and "direct control," there must be failure of electricity for heating purpose, in view of its low thermal value as an agent in this direction, if the price does not partake of the quality of the thermal value. This brings us to the combination of originality and truth. "If the income of the electricity supply undertaking is to be still further increased, there is no question but that the rates will have to be reduced or altered, so as to permit *waste* of electricity; for until people feel free to be careless, the consumption will be very restricted." Mr. Matthews reiterates this later in the notes, by remarking that "the whole situation can best be summed up by saying that, whatever the price charged for electricity, or the form the charge may take, it must permit of *waste* by careless domestic servants." That is the point; and we compliment Mr. Matthews upon his sentient acknowledgment. The whole case for electric lighting, heating, and cooking, is built up on the hypothesis that the agency of electricity eliminates all waste. But it is not so; and it is well to recognize that human nature steps in to upset the hypothesis. This is occasionally appreciated by our electrical contemporaries and central station engineers, when they make the point that strict discipline in the use of electricity is as essential to commercial success as the electric lamp is to the obtaining of light from the current. Strict discipline *plus* a margin for waste; and even then in heating and cooking the chances of electricity are small.

The discussion still rages as to what is best to be done to supplement electricity demand for private purposes. There is a fear that the current half-year's trading accounts of electricity undertakings will disclose a heavy falling off in the lighting units, owing to the considerable change-over to metallic filament lamps before the long lighting-hour days set in. The question of municipal hiring and wiring has been taken up by the "Electrician," and the views of station engineers have been canvassed. There is a general feeling that more must be done to foster consumption. But the question is, How? Opinion oscillates over the point as to whether or not municipal authorities should take up municipal wiring and hiring. It is, however, rather a matter for observation that there has been no conspicuous cry of anguish from the municipal electricity undertakers over the defunct permissive wiring and hiring powers that were proposed in the Electric Lighting Acts (Amendment) Bill. Judging from the opinions in our contemporary, there appears to be a feeling that the better course for municipalities is not to interfere with the wiring business, but to get hiring powers, under which they can hire-out and connect appliances, and subsequently make periodical inspection. In this way, the hiring facilities it is thought would benefit the wiring contractors' business, and at the same time help to boost the day consumption. The wiring of houses as part of municipal enterprise, there is no doubt, is a risky business—financially; and so we think is the hiring-out of electrical appliances. Their first cost, the wear and tear, and upkeep expenses, are all heavy; and yet for the supply of such appliances, electricity, it is proposed, shall be sold at a cheaper rate than for lighting. The most remarkable thing is how level-headed business men can fancy they see an ultimate financial advantage in the hiring-out business under such conditions. The contractors will not touch it. They have not the capital, or the facilities for dealing with it. If anything, it is a more risky business for them than for the electricity suppliers—bad as it is for them. Altogether, electrical contractors do not get much encouragement. But they are free lances. Their business is to make a living; and they have not much care whether a customer wants electric wiring or gas piping and gas fittings, or whether connection is to be made direct to the electricity system, or to the gas system, or whether a private electric generating set is to be put down with an engine driven by town or suction gas. Their favours veer with customers' preferences; and the bigger the job, naturally the bigger their profit. On top of all is the displeasure of the electricity supply industry, save in the highly favoured districts, with the current position of affairs.

PERSONAL.

Mr. R. J. Lukey, the Secretary of the Australian Gaslight Company, was one of the delegates for the Falmouth Chamber of Commerce to the seventh Congress of the Chambers of Commerce of the British Empire, held in Sydney, N.S.W., last September. Mr. Lukey is a native of Falmouth, and was formerly Secretary of the Falmouth Gas Company. It must have been gratifying to him to have been so kindly remembered by his fellow townsmen on such an interesting occasion.

At the meeting of the Tunbridge Wells Town Council last Wednesday, Mr. William Henry Delves, J.P., was elected an honorary freeman of the borough, in recognition of his eminent services during the twenty-seven years he has been a member of the governing body of the town. He has been an alderman since 1892, Chairman of the Finance Committee since 1887, and was Mayor in the year 1900-1. Alderman Delves made the customary declaration, and received from the Mayor (Mr. H. M. Caley) a scroll recording the appointment. The address, beautifully illuminated on vellum, was enclosed in a double-door frame, covered with green velvet calf, lined with silk, having silver mounts, with monogram and the arms of the borough. Alderman Delves, who was very cordially received, said that he was deeply grateful to the Council, and especially to the Mayor, for the kind words with which they had recognized any little services he might have been able to render; and it would be an incentive to him to continue to use his best endeavours in all things for the benefit of the town in the few years he might have to live. Alderman Delves is the Chairman of the Tunbridge Wells Gas Company; and at the monthly meeting of the Directors on Wednesday, opportunity was taken to congratulate him on the honour which had been conferred upon him by the Town Council.

OBITUARY.

The death is recorded in our American contemporaries of Mr. Thomas J. Hayward, the President of the Bartlett-Hayward Company of Baltimore and New York, well-known contractors for the erection and equipment of gas-works. Mr. Hayward surrounded himself in his business with young and capable men, who were trained, under his guidance, in the manner which he knew would make them the most useful to themselves as well as to him; and to his sons and to them the business will now be passed over.

We regret to record the painfully sudden death, last Tuesday morning, at his residence, North End House, Portsmouth, of Sir John Baker, the Chairman of the Portsea Island Gas Company and of the Woking Water and Gas Company, and a Director of the Portsmouth Water Company. Sir John, who was apparently in his usual health, rose at his accustomed hour. After breakfast, his housekeeper went to him to receive his instructions, and while she was speaking he fell back in his chair, and never spoke again. A doctor, who was at once called in, attributed death to syncope. Sir John Baker, who was in his 82nd year, was a native of Portsmouth, and head of a prosperous woollen business; and his services to the town were manifold. He was a member of the Corporation for more than fifty years, a Justice of the Peace, a member of the Hospital Committee for twenty years, and formerly Chairman of the Board of Governors. He was for twenty-one years Chairman of the old School Board, was a Guardian of the Poor for eighteen years, and a Governor of Portsmouth Grammar School. He was twice elected Mayor and three times member of Parliament for the borough, which he represented at the time of his death. He was also the senior alderman. Sir John received his knighthood as a New Year honour in 1895, and was made a freeman of the borough in 1901. The funeral took place at Kingston Cemetery, Portsmouth, on Saturday, and was attended by the Mayor and Corporation, the Magistrates and public officials, representatives of the various bodies with which the deceased had been connected, and a large gathering of townspeople.

THE STRIKE OF GAS WORKERS IN ITALY.

A Review of the Position—The Amazing Demands of the Men—Practically Full Supply of Gas Restored.

By dint of foresight and good generalship, the citizens of Milan, as well as the other towns, the gas supply of which is controlled by the Union des Gaz and the Continental Union Gas Company, have been spared the evil consequences of a collapse of the gas supply to which the remorseless and selfish conduct of the gas workers, in attempting to enforce irrational claims, exposed them. It is to Milan, the principal station, that our previous references to the matters leading up to the present position have been mostly directed; and in making a somewhat lengthened review of the unique conditions subsisting between masters and men, and the (if a comparative expression is here admissible) still more unique demands of the latter, the information and comments will be almost entirely confined to that city—more especially as visits to Milan in the past have made us cognizant of the conditions there. But it may be taken that what is said here has also, in the main, application to Genoa, Alessandria, and Modena. But in the forefront of this review, there ought to be acknowledgment and congratulation to the Chief Engineer at Milan (Mr. Clement Hovey) and to the General Manager (Signor Grüss), as well as to the whole of the staff, for what they have done in meeting an extraordinary conglomeration of affairs that is without parallel in the history of gas supply. The big strike, by the way, commenced yesterday fortnight at the largest works in Milan (the San Celso); and the latest advices assure us that everything is now proceeding satisfactorily.

The Milan Works.

Before, however, dealing specifically with the matter in hand, it may be of interest to give a few general particulars regarding the works at Milan. From the Municipality, the Company hold a concession, which runs to 1925; and this applies to the whole of the city. Gas is supplied at a very cheap rate—13 to 15 c. per cubic metre; and this price, no matter the condition of the markets for raw material or residuals, cannot be raised. This rigid limitation of price is a condition under which British gas undertakings are fortunately not called upon to operate. However, for the price named, the Municipality insist that gas of an illuminating power of 105 litres per Carcel shall be supplied; and there is absolute strictness with regard to this. The population of Milan is 600,000; and it is rapidly extending. Naturally, under such circumstances, the Company are constantly augmenting the number of consumers; and a further effect is large extensions at the works. The new works at Bovisa have been generally described in our columns. Designed by Mr. A. F. Phillips, the first section of the plant there has a capacity of 2 million cubic feet per day; and the second section, which is now approaching completion, will have a capacity of 2½ millions. In connection with the latter, a new inclined retort-house is nearly finished—the contractors being the Stettiner Company—and gas will be made in it in a very short time. At the large works at San Celso, where the strike first broke out, inclined retorts are used exclusively in No. 2 section; and in No. 1 section the carbonizing plant is divided between horizontals and inclines. There are six batteries of retorts—eight in a setting, and ten settings in a battery—in the new, or No. 2, section. The total number of men who are required in this one works cannot possibly be less than 500. The third works are old; and in them horizontal retorts are used, with Arrol-Foulis machinery. The main streets of the city are lighted by electric lamps; but the major part of the public lighting is by incandescent gas-lamps, and, as we can bear witness, the lighting is exceptionally well done. In addition to Signor Grüss, the General Manager, and Mr. Clement Hovey, the Chief Engineer, there are other British and Italian engineers in charge of the works, all of whom must have rendered yeoman and faithful service during the present hostilities between the workmen and the Company, the former of whom have been working to assume complete control of employment in connection with the concern. It is fortunate for the Continental Union Gas Company and the Union des Gaz that, at this critical and anxious time in the history of the joint concerns, they have strong Boards of Directors in London and in Paris, and that their Consulting Engineer (who is also a Director) should be Mr. A. F. Phillips, and their Secretary, Mr. W. Martin, both completely conversant with the peculiar conditions affecting gas supply and labour in Italy, and both of whom have been working hard in these critical times.

The Position of the Gas Workers.

Labour in Italy is in a perpetual seething condition. It is ever on the alert for obtaining additional advantage. There is no consideration for others; and selfishness is the dominant law. The gas workers of Milan pay no heed to the limitations under which their employers work and seek to comply with their obligations. The low and absolutely fixed gas price beyond which they cannot go—high market costs notwithstanding—is a factor that the men do not take into consideration. If the Company had a little more latitude in this respect, and enjoyed the same privileges as gas suppliers in Great Britain, then, possibly, there are sections of the workers to whom—though generally speaking all are well paid—there would be further concession made. The stokers, we believe, receive practically 6 frs. per eight-hour shift; and the labourers are paid up to 4 frs., and even more, per day. There is nothing to complain about in these wages, more particularly considering, as we have had opportunity of observing, the amount of work that is performed per man. If it were possible for the Company to have the gas workers of other nations, they could successfully carry on their operations with a greatly reduced staff of men.

This disability as to labour and pay standing alone could be tolerated; but it is not the worst feature of the conditions ruling between masters and men. The Company, or their chief executive officers, cannot discharge men, without reference to a commission of the latter. The men are therefore the controlling authority, or masters of the situation so far as discharge from employment is concerned—a condition that is incomprehensible to gas authorities here, and is incompatible with economical and smooth working. But so it is in Milan. The Company have tried, in every conceivable way, to show that they desire to work amicably with their men; but the latter are insatiable. The end of forbearance has been reached; and the Company are now showing that they must control their own affairs, if they are to comply with their obligations to the city, and, at the same time, secure reasonable reward for their capital and services. That is all the Company want—nothing more. They are only paying fair dividends—not nearly the like of equally (in volume of business) prosperous companies in this country. Judging from reputable Milan newspapers to hand, public sympathy at this time of stress and anxiety is undoubtedly with the Company, inasmuch as it is recognized that they do give to their men good recompense for the labour accorded, as well as other generous treatment in the way of pensions, allowances in times of illness or suffering through injury, and the provision of comfortable environment on the works.

The Weekly Rest Law.

Notwithstanding all this internal consideration, external forces come into play to add to the pressure of labour on the Company. This year, for instance, the weekly rest law has come into operation in Italy. As to gas-works, all men who are not working on eight-hour shifts must receive one day's holiday per week free from any work, and that day must start not later than seven o'clock in the morning. All other classes of labour the Company treated—after discussion with the men—in a most liberal manner. The labourers, the Company agreed to pay for a Sunday, or one day's rest, per week; they put on to eight-hour shifts many men who had previously been working for twelve hours a day; and they made other arrangements so as to meet the new conditions, in various branches of the service with the utmost considerateness. The difficulties are seen when it is mentioned that, in Milan alone, the Company employ (we should estimate) some 1000 men. The stokers, it should be explained, have been on eight-hour shifts for some time; and the one-day rest law specially provides that men employed in gas manufacture are exempt from the necessity of being given the twenty-four hours' complete rest. This is perfectly correct in the interests of routine working, because the men change their shifts at the end of the week; and if their position is considered, it will be found that they receive at the change-over of shifts twenty hours' complete rest one week, twenty-four hours the next, twenty hours the next, and so on. Besides this, as is well known, gas stokers—especially those on inclined retorts—are not now subject to arduous work; and although the hours of work are nominally eight, they are actually only on the works, as a rule, about seven hours, and, during that period, they only work three to four hours. It is interesting to note in passing, that at the San Celso works, the hot coke is removed by labourers by means of waggons run on rails, which is a good system under certain conditions, especially if the plant is maintained in excellent order, so that the waggons may be easily propelled. From our own knowledge of the works, the plant is kept in the necessary condition to facilitate ease in working.

Preliminary Stoppages and Culminating Big Strike.

As was reported in the "Journal" for Oct. 19, there was a twenty-four hours' strike of the men engaged on coke work at San Celso works. It is evident this particular section of men have ever given the Company much cause for complaint. That, however, was the first of the series of recent strikes. But this action on the part of one section of the men did not meet with the approval of the other sections, who were offended with them for their impatience in not waiting for the Federation presenting their general demands for all classes of the men. But subsequently, as reported at the time, the malcontents agreed to waive their demand, if they were included in the general demands which were to be presented by the Federation. The second twenty-four hours strike was through a general one of all trades in Italy in protest against the execution of Ferrier in Spain. These two strikes happened within one week. Then on Nov. 1 came the big strike of gas workers at all the stations of the Company; and a large majority of the clerical staff, who are also members of the Union, together with the foremen, went out with the men. The general demands had been presented by the Federation, and had been submitted to the London Board. But, in view of the many concessions the Company had previously granted to the men, the Board rightly and naturally refused the exorbitant and wholly unprecedented demands. Hence the strike, which happily has

been coped with in most masterly fashion, and with a minimum of trouble to the consumers, in the cities and towns concerned.

The Demands of the Men.

It is worth while, in view of their unique and ambitious character, to examine the demands of the men, which show the contempt in which they hold all the moral principles that should subsist between employed and employer. The principal of the demands were set forth last week (p. 388), and we will review them in the order presented.

1.—In the first place, the men demanded the abolition of arbitration. In 1907, the Company gave the men 10 per cent. advance in wages, with other generous concessions in connection with their scale of pay according to the period of service, &c., provisional on recourse being had to arbitration in respect of the conditions of labour, including the number of men employed on certain classes of work, examining claims of the men, verifying the complaints, with other minor matters. The Arbitrators, although appointed by the Syndics of the various towns, although, too, they have taken evidence since that date, have not issued their complete decisions, although, it should be said, that within our knowledge certain preliminary decisions have been issued, which were accepted by the men. From the present drastic move of the workers, it is not difficult, and it is fair, to infer that the men were apprehensive that the final decision of the arbitrators would not be entirely in their favour. Hence the apparent desire to suppress the remainder of the decisions by the abolition of the agreed arbitration.

2.—Then the men demand that all piece work should be abolished. On the face of it, this demand coming from a body of workmen who profess to be underpaid is extraordinary and ridiculous. It is known from what was recently published that the men rejected a system of co-partnership which was thought by them to be, as we previously expressed it, "an evil thing." This at all events gives some insight to British engineers and to engineers of other nations into the unreasonable ideas prevalent among the Italian workmen employed by the Company.

3.—As to abolishing the further engagement of contractors' men on any work connected with the manufacturing and distribution services or extensions. As already stated, the Company are making large extensions; and it appears to us that the abolition of contractors' men would mean that the Company would have to execute all such work themselves—no matter how uneconomical such procedure might be. We know, too, that the system exists in Italy of contract labour for such things as mainlaying, house piping, and placing of slot meters, as well as for such services as the carting of material. This system, we believe, is the vogue at the Company's various stations; and, under Italian conditions, it is a great convenience and economy, as it enables the Company—whose operations are rapidly extending, and who have large quantities of material to deal with—to negotiate this work, which is irregular in volume, in an economical and expeditious manner. Judging from the quantity of gas that the Union des Gaz now sell, they must import into Italy well on towards 400,000 tons of coal per annum. This indicates the importance of this particular work. The coal, which is practically all of it British, is received by boat. When large consignments arrive, it is natural the Company should deal with them through contractors; and we see no other system whereby—we repeat under their conditions—they could carry out the work with due regard to economy.

4.—The fourth request is about as monstrous in character as it well could be. It is that at each works there should be established a bureau, comprised of men of the Federation, who would solely have the engaging of the men. To concede this would be to surrender the last right of employers to engage for their service those whom they pay. We believe the Company's administration have already, by agreement with the men, allowed what are called Commissions of Vigilance to be formed at each station; and when any complaint on the part of the men is made, it is presented to the respective managers by the Commissioners. If we are right in this assertion, the men already have every opportunity of placing the case of any individual before the Managers in a complete manner; and it must receive—there is responsibility attaching which makes it imperative—attention in a just and careful manner. The men now, however, wish for a bureau composed of members of the Federation who would solely have the engagement of the men. Words fail to adequately describe the utter unreasonableness of this. It is the common recognized principle that the manager of a works should have the right to choose the number and description of men he may require. He has to take the double view of considering the interests of the company and fair dealing with the men in regard to the distribution and character of the work. The only true and proper regulation can be through the management. If this were not done, it is certain that no works could be carried on in a regular and successful commercial manner. To allow the men themselves to decide the number of men to be employed, and to judge as to the suitability of men in regard to character and competence, would lead to absolute chaos, and would open the door to all sorts of intrigue and injustice. If no other demand than this one were preferred by the men, it would be sufficient to justify the Company in their resolute attitude.

5.—Coming to the question of the non-dismissal of a workman unless it is in accord with a commission of the men. As already stated, a commission of the men at present discusses with the Manager any injustice—real or imagined—affecting the workers; and naturally in this case, they would be able to seek redress by the powers already enjoyed. In any case, dismissal of the men should rest entirely in the hands of the Manager; and if there is any injustice done, there are always, on wrongful dismissal, the Courts to which anyone aggrieved can readily apply—in Italy as in England. From our knowledge, too, of Italian law and Law Courts, the whole procedure is much more elaborate, and inquiry is made in more detail—to the point of the trivial at times—than would be tolerated in this country, either on the part of masters or men. However, from what has previously been recorded in the "Journal" as to the insubordination and indolence of the men—the latter of which is attested by their desire to reject piece work—it seems to us to be imperative that in Italy more than in any other country of which we have acquaintance, the power of dismissal or otherwise should be vested solely in the management. Only by this means can improvement be effected in the working of the concern, tending ultimately to the betterment of the workmen's conditions.

6.—As to the sixth claim, the men take a remarkable flight for a measure of leisure which many besides gas workers could enjoy, if it were reasonable. They ask for twenty-four days' holiday, with full pay to the stokers, in addition to the 37 days' rest allowed by law. The 37 days is not a correct figure, as calculation will show. The stokers, it will be remembered, were excluded from the day's rest, inasmuch as they get it to the extent of 20 and 24 hours at alternate week's changes of shift; and this, if computation is made, it will be found, represents nearly 46 days. The law considers that one day's rest in seven is ample. But the stokers are asking for this additional twenty-four days with full pay. The law, as well as the practice in Britain and other countries, are against the men, whose claim is launched now though the conditions of labour are much easier than formerly.

7.—Coming to the seventh proposal of the men. After three months' trial, it is required that new men shall be employees. Any company recruiting men naturally engages them with as great care as possible under the circumstances of the moment. But inevitably a certain proportion of the men must be engaged with whom the employers are not satisfied for one reason or another. In other countries, when such men are engaged if they are not satisfactory, they are removed from their positions at the earliest practicable moment; and they are replaced by men who will give regular and efficient service for their pay. Reverting to claim 5 it will be seen that the men request that no man shall be removed from his position without the consent of the Commission. This leaves the decision as to whether a man is doing a sufficient amount of work, as to whether he is honest, as to whether he is a satisfactory servant entirely in the hands of the workmen, as represented by the Commission. Thus it is desired to remove from the hands of the Company all powers of selection and dismissal. We do not think that anything more ludicrous than this has ever been put forward by sane men in the whole history of labour.

8.—Again the desire for supreme control is seen here. The number of labourers, it is claimed, is to be according to the exigencies of the service, as decided upon by the men. It would be waste of time to comment on this further absurdity on the part of the men.

9.—To reduce the old age limit of insurance from sixty to fifty years for those who work in warm places. When all the arrangements are considered that are made in the way of provision for the men, all the care taken to ensure hygienic and comfortable conditions, in the retort-house as elsewhere, the claim is not one that would have been expected from a body of men so well favoured as these.

10.—Here we have another instance of the grasping tendency of the workers. They ask that after 21 years' service, all employees shall be paid 5 frs. per month extra for length of service. We know the Company have an agreement with the men called the "Organico," which is of a very elaborate nature, and specifies the conditions of work and of payment, pensions, &c. Already the men's scale of payment is according to their length of service—that is to say, a scale which gradually increases according to duration of service. For instance, the labourers are paid from 3 frs. to 4 frs. a day—at the lower rate on commencing service, gradually increasing to the higher. The same thing applies to the other classes of workers—of course, with varying payment for the class of work performed. Upon this now they want the additional 5 frs. per month after 21 years' service!

11.—We should compute that the claim for 24 days' holiday, if acceded to, would mean for the Company about 8 per cent. increased cost for labour; and the 5 frs. a month after 21 years' service, another 4 per cent. on labour costs. But that is not all. The eleventh demand is to the effect that those men who currently work ten hours per day are only to work nine hours from November to February. Again, a little reckoning shows that the length of service of each man would be reduced 10 per cent., or, in other words, that the number of men would have to be increased by one-ninth to accomplish the same amount of work.

12.—But the scheme of additional financial infliction on the Company is not ended here. The twelfth demand is that the wages are all to be increased 10 per cent. It is only two years ago the men received a 10 per cent. advance; and, if report is reliable, the men on presenting this new demand stated that they had reduced what they had originally intended to ask for, and therefore they hoped the Company would treat them justly!

13.—Coming to the special demands. The first request is for

one extra stoker per battery per shift of eight hours, equalling three per battery per day. Assuming that there are six men at present employed per battery (if memory serves us right, there are eight retorts in a setting, and ten settings in a battery), an increase of one man per battery would mean an increase of 16⅔ per cent.—that is, on the present cost, and, on the new costs proposed, it would be considerably more. The number of men employed was evidently considered by the arbitration arranged in 1907; and the number, of course, should be regulated by such arbitration. In England, instead of six men, we should expect the work to be done by five men, who would receive about 5s. per shift, while at the present time the Italian stokers receive about 6 frs. per shift for less work. This shows that they are already well paid, and that, if their number is six per battery, there should be complete satisfaction. But there is not.

Then the boiler men demand one extra man per shift for every two boilers. We know many places where one man attends to three or perhaps more boilers, depending upon the size of the latter, and the manner in which work is exacted of them. The present scale being one man for every two boilers, it is evident the request would increase the wages for boiler labour by 100 per cent.; and if the increased scale of wages be taken into consideration, then the amount would be still further augmented—in fact, it would reach beyond two-and-a-half times what it is now, equalling an increase of over 150 per cent.

The exhauster men also want concession, by being treated as retort-house stokers, and having eight-hour shifts. It was seen by the table published last week that the motor men (as they are called) receive up to 5·50 frs. per day of longer period than eight hours—presumably twelve hours. Therefore, to treat them as retort-house stokers, would mean that where two men are engaged at present, there would be three in future, and all three would receive payment on the increased scale demanded by the retort-house stokers. And not only so, there would be the 24 days' holiday, &c. Exhauster work is extremely light; so that the demand to be treated as retort-house stokers is altogether beyond reason.

The labourers are in the running. They ask to be considered as second-class stokers, and to have their numbers increased by one to every seven, also that their pay be increased in addition to the general 10 per cent. advance. It should be explained that the term "labourers," in this instance, means the men engaged in taking coke from the retort-house. Their demand for the addition of one man to every seven, of course, would represent no less than 14 per cent. cost to the Company without the other demanded special or general increases and considerations. The application to put them on the same plane as second-class stokers would also mean the raising of their scale of pay from between 3 and 4 frs. to possibly the equivalent, at present, of 5½ frs. per day.

Then it is asked that men should be promoted according to seniority in service, and not according to merit. It is a topsy-turvy world of their own creation in which these Italian workers live. The proposal is altogether opposed to intelligent management, to the interest of the Company, and to the interest of the men themselves, in that, in the last regard, such a rule would suppress all encouragement to individual effort and improvement. It provides an interesting side-light on the perverted notions of the Italian gas worker.

Following is a demand for increases in the payments that the Company make on account of each man, so as to enable him to have a suitable pension at the age of sixty. All the workmen, clerks, &c.—all, in fact, of the Company's employees—are under the pension scheme; and this claim appears to be a desire to have the pensions considerably increased. It only shows that the men have not left a single channel unopened through which they hope to secure some advantage.

We will not proceed further with this criticism of demands. There was much more detail given last week, all pointing to the handsome consideration meted out to the Company's workmen. It is a surprising thing that the clerks should be enrolled with the men in these unreasonable demands. One would at least have expected from them a more intelligent appreciation and consideration of the position, and of what they owe to their employers. They are paid well, and have liberal treatment in regard to holidays, sick allowances, pensions, &c.; so that there is no tangible grievance that they can possibly have. At the bottom of it all is the dominating spirit of selfishness, and of such a misguided character that, if the demands were granted, it would mean an increase in the cost of working of about 40 per cent.; and this would result in nothing short of financial disaster.

The Big Strike and the Successful Continuity of Supply.

It was in the evening of Monday a fortnight since that the great trouble burst over the Milan stations. The stokers ceased work at San Celso, and they were at once requested to leave the premises, which were immediately placed under military protection by the authorities. This stoppage was followed during the evening by the cessation of work by the men at the other two Milan stations—Bovisa and Porto de Nuova. The Company's officials, including Mr. Hovey and Signor Grüss, took prompt measures (for which they were prepared) for carrying on the work by other men. It is patent that some very smart work was performed in this direction, because the city has been supplied with gas every evening, during the principal lighting hours, since the notable day of the outburst. If there had been any delay in carrying on the work, it is evident the retort furnaces would have gone out, and the retorts would have become cold; and the supply of gas to the city could only have been from the stock which was in the holders at the moment of the strike, and that would not probably have been more than sufficient for an evening or two. But from advices to hand, we learn that the supply of gas to the city was only interrupted to the extent of the gradual reduction of the pressure for the first three or four days of the strike; and then it began from that time to improve until, on Monday evening last week, the Company had so much gas in stock that they resumed the lighting of the lamps in the streets. At the time the strike occurred, all the lamps were alight; and, the lamplighters striking with the other men, the lamps were left burning. These were not extinguished the following morning. This was deliberately done in order to waste gas, and make it more difficult for the Company to maintain a proper supply to the consumers. This would naturally have handicapped the Company very considerably, by retarding the increase in the stock of gas, so as to be able to again give the city an ample supply. As has been said, the Company again lighted the majority of the lamps on Monday evening last week; and the whole city received a full supply of gas at almost normal pressures from the fifth day after the strike. The inhabitants were still receiving an adequate supply at the time of our latest information.

The working staff of the Company cannot be less than 1000 in Milan; and the condition of things in regard to the carrying on of the manufacture and distribution reflects the highest credit on the officers of the Company, particularly upon the Chief Engineer and the technical staff under him. It must be remembered that this work has been carried on under a cloud of difficulty. There were the ineffable influences of the strikers outside the works; a sense of anxiety brooded over the operations; and above all within the works the staff of men the Company had provided could not have been all accustomed to the details of the retort-house and of gas manufacture generally. It is almost inconceivable that such a large staff of men could be organized and set to work in such a short space of time. It was done, and done in Milan. But it could only have been by the control being, within the works, directed from one point, and, of course, by good and loyal assistance. We know that men have gone out to Milan from British gas-works; and we venture to say that they have been, and are, rendering a good account of themselves. But the total number of men now engaged on the works must be much smaller than the staff of workmen that the notions of the Italian gas workmen place as desirable. In the new staff are, we believe, men of other nationalities; and they, too, are showing how to give an honest day's work for an honest day's pay. The Italian papers also mention that many Italians have also been employed; and, to their credit be it said, they are working under good control and discipline. This information applies to all three works. But considering these matters, we repeat that the control to keep the new staff in working order, and to maintain them on the works (because naturally it would have been impossible for them to go into the city without endangering their lives), must have been very complete. As has been seen from the daily papers, men have been attacked by the strikers in various ways; but exaggerated statements have appeared in the press, and they must all be taken with a grain of salt. Naturally, there have been the usual accompaniments of such occasions—attack by stick, stones, and other missiles, and other cowardly acts by large groups of strikers. The authorities, however, have done, and are doing, their part in the matter of extensive military protection, which it was found necessary to augment last week. In the interests of peace and order, and the defence of legitimate business, it is the duty of the authorities to provide proper guard; and it is hoped nothing will be neglected to allow the men who have engaged themselves to the Company in this time of conflict to pursue their work without molestation. Besides this the public safety and convenience in respect of the multitudinous services rendered by gas in domestic, industrial, and public life, demand that there shall be the fullest protection. So far as the public are concerned, they have taken any little inconvenience occasioned with the greatest of patience, knowing that any small defection in supply will be rectified when peace is restored. The notices for the discharge of the men were posted at Milan and Genoa last week, and probably in the other towns as well. Naturally this caused much excitement; and it was thought likely that it would be necessary to provide against other contingencies, and attempts at injury on the part of the strikers.

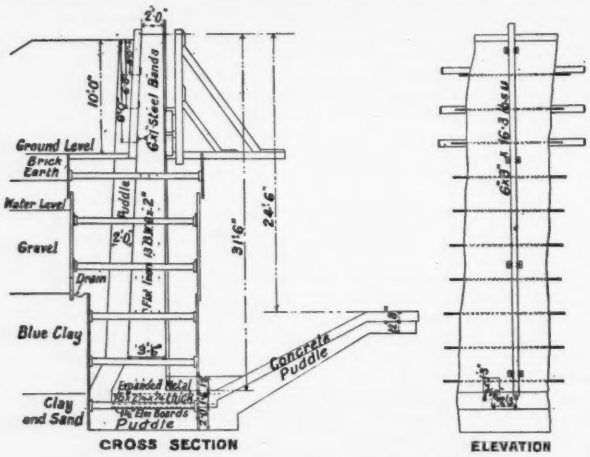
It is with the greatest pleasure we are able to report such remarkable progress in so short a space of time; and upon it all we congratulate the Company and their executive staff who have worked with such good result to meet this vital struggle in the history of the Company. It is a struggle for control being vested in the rightful hands, for release from oppression from the workers, and for the perpetuation of fair conditions. What has here been written principally applies to Milan, being the largest station; but in Genoa, Alessandra, and Modena, the Managers, Engineers, and their staffs have equally done their part within their own spheres. The vertical retorts at Genoa, owing to the few men required for their operation, have been of great assistance; and at all the towns, a fair supply of gas has been maintained. At these places, too, the authorities stepped in, and did their part in the matter of protection. But upon Milan eyes must be kept; for from Milan the workers at the other stations will take their cue in the matter of future procedure.

NEW HOLDER FOR THE ENFIELD GAS COMPANY.

THE new holder which has lately been erected by the Enfield Gas Company was brought into use on Monday last week by the Chairman, Colonel Sir A. P. F. C. Somerset, K.C.B., turning the gas into the mains serving the district. The whole of the work, of which some particulars are given below, was constructed to the plans of the Company's Engineers (Messrs. W. A. Valon and Son, of Caxton House, Westminster), under the supervision of Mr. Arthur Valon, who, as our readers are aware, is carrying on his professional work under the old style.

THE STRATA.

Previous to the preparation of the plans, a trial hole and two boreholes were sunk on the site; and it was found that from the top downwards the strata comprised brick earth varying from 2 ft. 4 in. to 3 ft. 4 in. thick, gravel from 5 ft. 9 in. to 11 ft. 3 in.



The Tank Wall and the Strata through which it was carried.

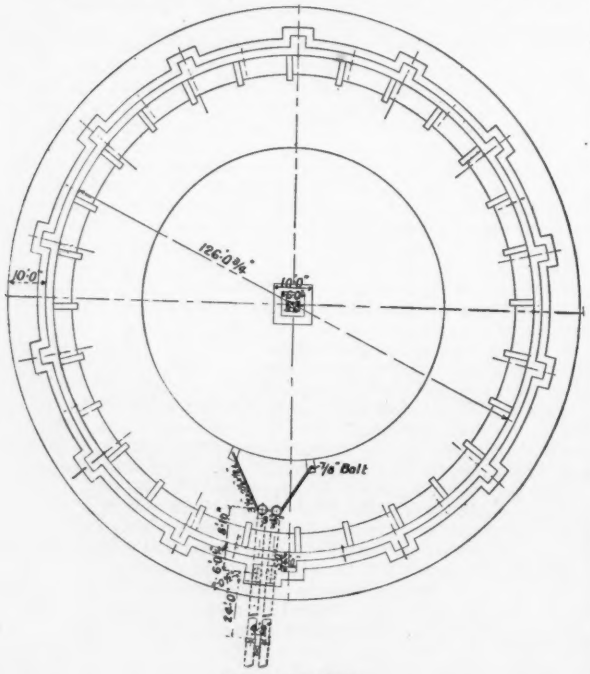
thick, blue clay from 7 ft. 9 in. to 11 ft. 3 in. thick, below this mixed clay and sand, and again below this sand. Although the thickness of each stratum varied so much, the level of the bottom of the blue clay varied only about one foot, being about 20 feet below the surface. The level of the water, of which the gravel contained a very large quantity, was only 5 feet below the ground level. Below the blue clay comparatively little water was found to a depth of about 29 feet; but further down the sand was full of it. Under these circumstances, it was decided not to sink the tank wholly below ground level, but to form an embankment 10 feet high, which would bring the bottom of the foundations of the tank 24 ft. 6 in. below the ground, and leave a bed of from 4 to 6 feet of light clay and sand above the sand and water.

THE TANK.

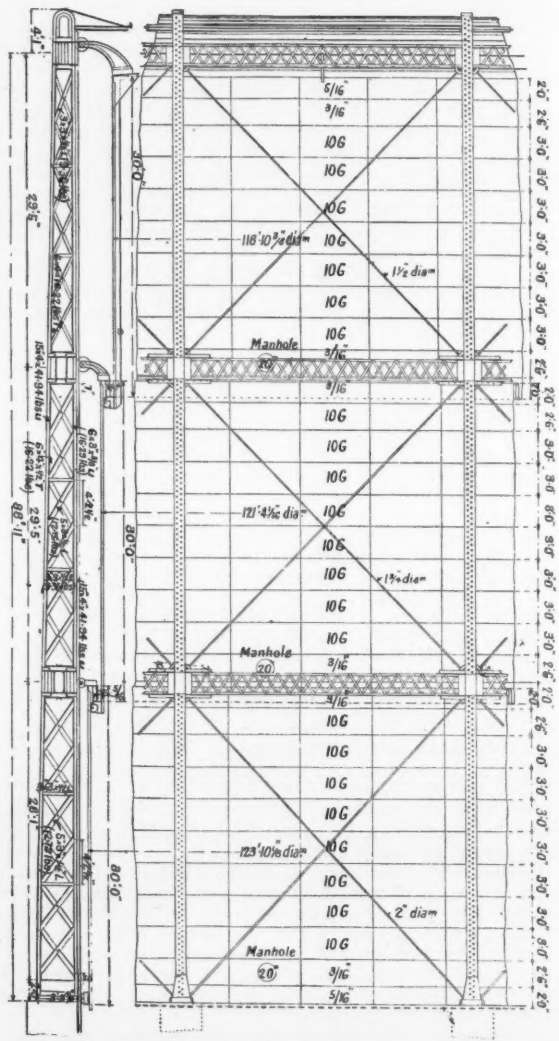
In excavating the tank, a trench of sufficient width to take the wall was sunk the full depth, and no material was removed from the interior of the tank until the wall had been brought up to ground level. The formation upon which the foundation was to be laid was composed of sandy clay of limited thickness, which, though quite safe when comparatively free from water, would be unreliable when saturated. It was, therefore, necessary to prevent the large quantities of water contained in the gravel above the blue clay from passing down as the excavation proceeded. The trench through the gravel was accordingly made wide enough to allow of a set-off on the top of the clay, upon which a drain was constructed round the whole circumference of the tank; the water from the gravel being thus collected and conducted to a sump, from which it was pumped. The whole of the excavation was close timbered except through the blue clay. The trench being completed, 2 feet of puddle was laid in the bottom, and on this 1½-inch elm boards were placed to take the concrete.

The foundation consists of 2 feet of concrete carried under the wall and across the trench to the foot of the dumpling; two layers of expanded metal being embedded in this. The concrete wall tapers from a width above the footings of 3 ft. 6 in. to 2 feet at the tank curb. Behind the wall is 2 feet of puddle. The concrete is composed of cement and ballast, in the proportions of one part of portland cement to six parts of ballast; the latter containing not less than 25 or more than 40 per cent. of clean, sharp sand. The whole of the ballast and puddle were obtained from the excavation. The timbering for the face of the concrete was composed of carefully-planed shuttering, formed to the curve of the tank; the concrete being carefully worked with a shovel against it. So successful was this method, that the surface of the concrete when set was almost as smooth as if it had been rendered. No stone was anywhere used in the construction. The rest-blocks for the holder were composed of concrete, the lewis bolts for the vertical guides were embedded directly in the concrete, and the standards were also bedded on the concrete piers without foundation stones. Over the dumpling, the whole of the gravel was removed down to the clay, which was then puddled and a layer of concrete placed over it.

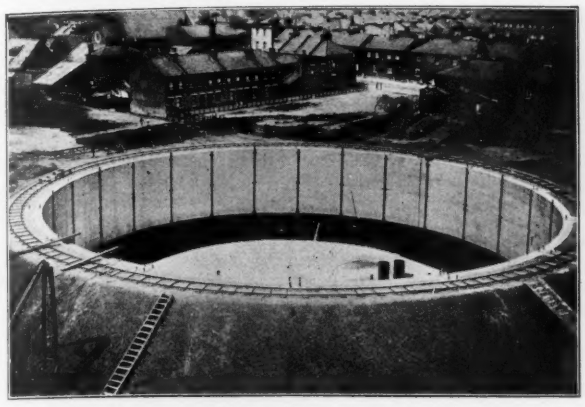
The diameter of the tank is 126 ft. 0¾ in., and the depth to the top of the rest-stones 30 ft. 3 in. No trammel was used in its construction; the setting-out being done by means of a steel



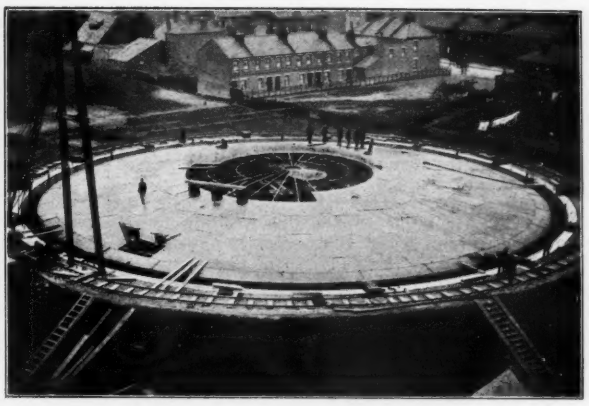
Plan of the Tank.



Details of the Sheeting and General Outline of the Standards.



The Tank Completed.



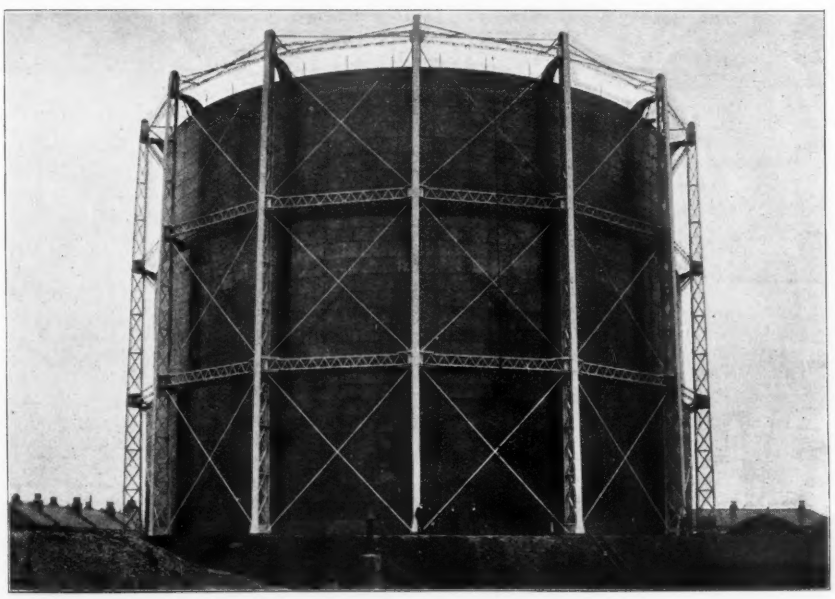
The Gasholder Crown during Construction.

tape. When complete, the greatest difference between any two diameters was only one-quarter of an inch.

THE HOLDER.

Lifts.—The holder consists of three lifts, each 30 feet deep; the outer one being 123 ft. 10⅜ in., the middle one 121 ft. 4 1/16 in., and the inner one 118 ft. 10⅜ in. diameter. It has a total working capacity of 1,004,786 cubic feet.

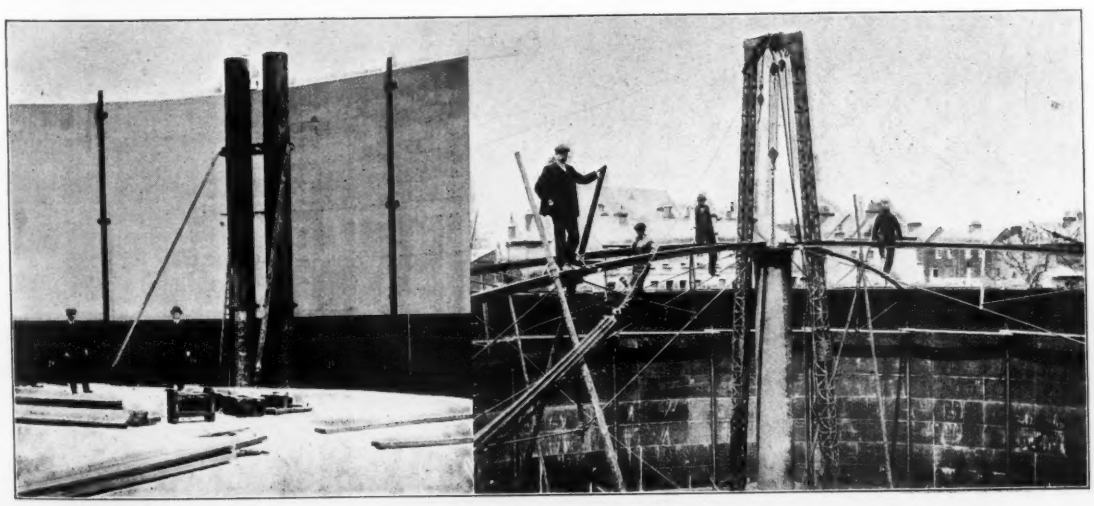
Strength of Material.—The steel was specified to have a tensile breaking strength of 28 to 32 tons per square inch, with an elongation of not less than 20 per cent.; but for bars to be welded the tensile strength was reduced to 24 to 28 tons, with an elongation of 24 per cent. For the rivet bars the tensile strength was 26 to 30 tons per square inch, with an elongation of not less than 25 per cent. The conditions of the tests were in accordance with the British standard specification.



The New Gasholder Fully Inflated.

Guide-Framing.—The guide-framing consists of 14 lattice standards, braced together with three tiers of horizontal girders and diagonal ties.

Standards.—The standards are composed of two channels, 15 in. by 4 in. by 41·94 lbs., with T-steel 6 in. by 4 in. by 16·22 lbs. riveted to them. The lattice web is composed of angles; the two lower



The Inlet and Outlet Pipes and the Trussing of the Holder during Erection.

bays being 5 in. by 3 in. by 12·79 lbs., and the top bay 3 in. by 3 in. by 9·36 lbs. The back and front flanges are connected together with stiffeners at each alternate lattice bay.

Horizontal Girders.—These are constructed of four angle-steel, 3 in. by 3 in. by 7·18 lbs., braced together horizontally and vertically with warren lattice bracing of 2 in. by $\frac{3}{8}$ in. flat steel. Where they connect to the standards, a web plate takes the place of the bracing, and they are stayed to the back and front flanges of the standard.

Crown.—The crown is made of ten rows of plates; the centre plate being $\frac{5}{8}$ inch thick and 4 ft. 6 in. diameter. The outer row of crown plates is $\frac{5}{16}$ inch thick; the joints being butted together with cover straps. The next row of plates is $\frac{3}{16}$ inch thick; the remainder, No. 10 gauge. The top curb is composed of angle-steel 6 in. by 6 in. by 24·18 lbs. The crown is trussed with a light steel trussing, and all the principals run right through from the crown to the circumference, there being no half-principals. The vertical guides and the main rafters are connected together by gusset plates; the outer row of crown plates being riveted to the main rafter, and the top row of side plates to the vertical stays.

Vertical Stays.—These are composed of 6 in. by 3 in. by 16·29 lbs. channel-steel next to the shell, with a 7 in. by 4 in. by 16·01 lbs. H-steel at right angles to it. Where H-steel only is used as a vertical guide, it has an unpleasant tendency, unless it be made very heavy, to fail sideways when it has to support the whole weight of the crown and trussing.

Bottom Plates.—The bottom plates in each lift have been made $\frac{5}{16}$ inch thick, as this row of plates forms one side of the cup, and between wind and water are more liable to decay. In order to further guard against this, it is desirable that these plates should be painted every year; and in this holder they have been finished a different colour, so that should in any year these plates only be painted, it will not spoil the general appearance.

Side Sheeting.—The top plates of the two outer lifts are $\frac{3}{16}$ inch thick; the side sheeting generally being No. 10 gauge.

Channel Guides.—The channel guides are continuous from the bottom of the tank to the top of the standard.

Bottom Curb.—This is constructed of two rings of angle steel 6 in. by $3\frac{1}{2}$ in. by 15·31 lbs., with chairs attached on the inside so as to give a wider bearing on the rest stones.

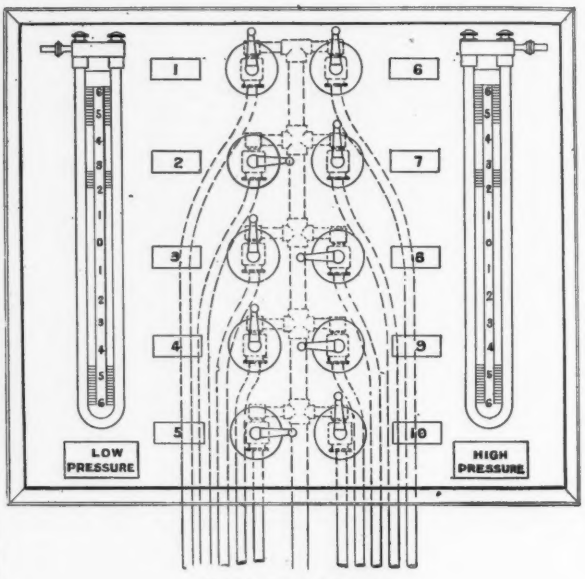
The tank was begun on June 4, 1908, and completed on April 8, 1909; the erection of the holder being commenced on April 20, 1909, and completed on Oct. 30. The water was turned into the tank on Sept. 7; the filling being finished by Oct. 11. The total cost of the holder and tank is equivalent to £11 2s. 2d. per 1000 cubic feet of storage capacity. The Contractors for the tank were Messrs. Thomas Docwra and Son, of Balls Pond, N.; and for the holder, Messrs. Clayton, Son, and Co., of Hunslet, Leeds.

LIGHTING OF ALEXANDRA PALACE.

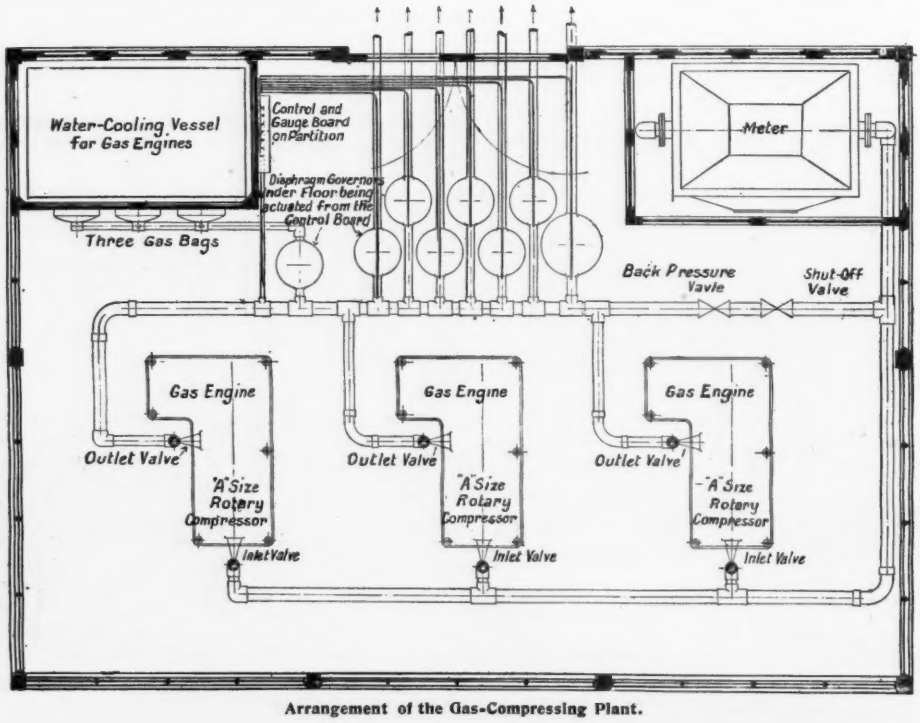
A Fine High-Pressure Installation.

In the course of the discussion on the paper which was read by Mr. H. N. Clark at the recent meeting of the Southern District Association of Gas Engineers (as reported in last week's "Journal"), Mr. A. E. Broadberry made reference, with justifiable pride, to a fine installation of Keith high-pressure lighting which had been put up for the Tottenham and Edmonton Gas Company, under his supervision, at the Alexandra Palace. This, he remarked, was giving a great deal of satisfaction; and the photo-

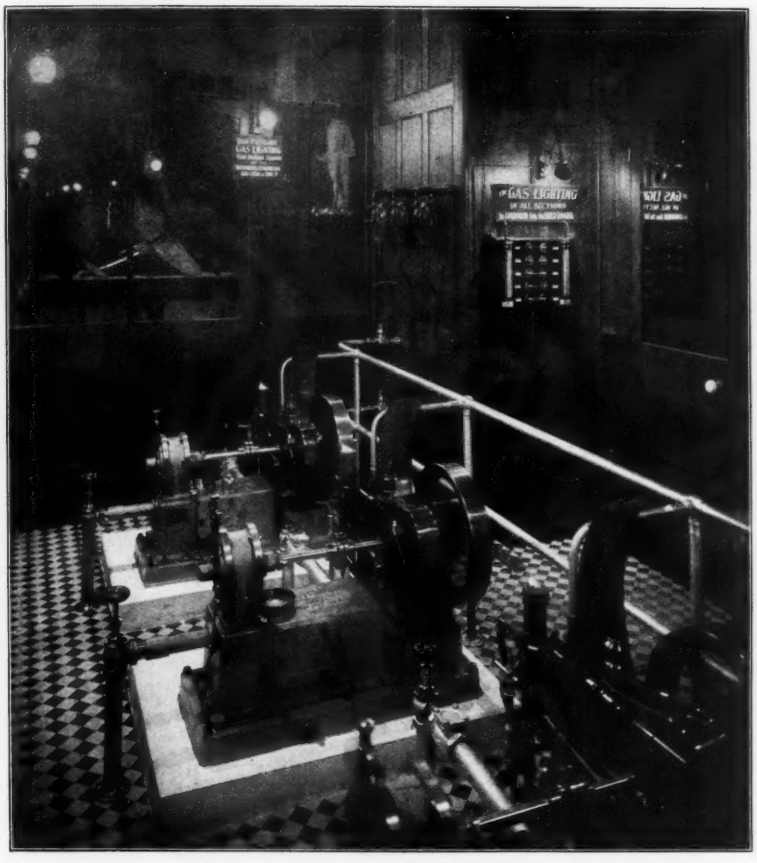
Diaphragm Gas-Governor arranged for Lighting and Extinguishing Lamps Fitted with Keith's Automatic Lighters.



Keith's Control Board.



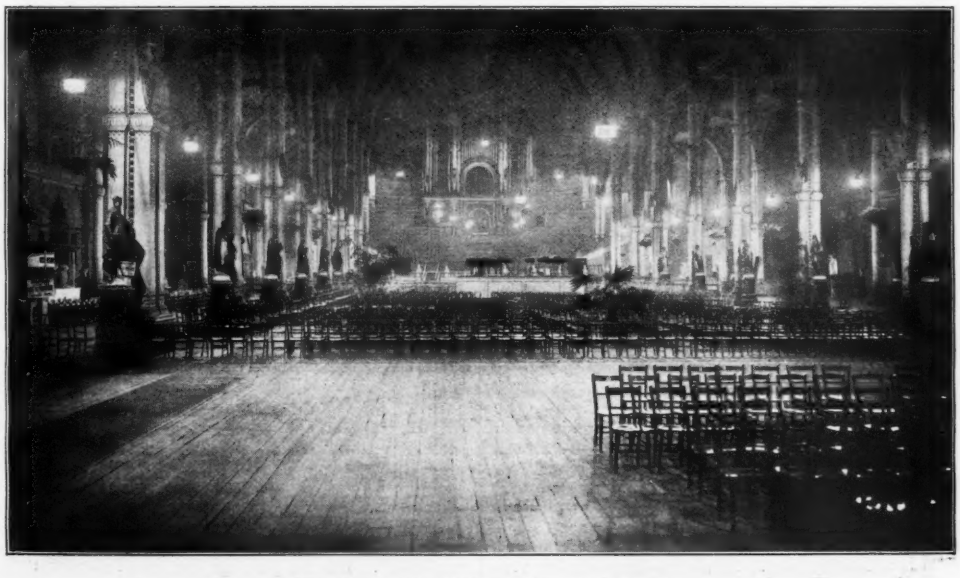
Arrangement of the Gas-Compressing Plant.



View of the Compressing Plant.

graph which we are now able to reproduce (through the courtesy of the James Keith and Blackman Company, the makers of the plant), will show how natural this satisfaction is. He stated also that the Palace authorities were delighted with the result; for they were saving a great deal of money as compared with the old low-pressure system of lighting. This is a condition of affairs on which both Mr. Broadberry and the manufacturers of the apparatus are to be congratulated; and it is also due to them to recognize the fact that a successful installation of this character is of much benefit to the industry generally, by reason of the practical demonstration which it affords of the capabilities, from the point of view of efficiency and economy, of gas as a lighting medium if subjected to up-to-date methods of utilization. The Alexandra Palace does not lie across the writer's line of travel; and therefore he cannot speak as to the number of people who may become personally acquainted with this excellent example of modern illumination. There must, however, be many visitors from time to time; and their interest in the matter is excited by the fact that they are able to get a good view of the compressors, which are arranged in a glass case, as it were, in a prominent position in the Exhibition Hall.

The plant consists of three Keith compressors, direct driven by small gas-engines, with the necessary gas-meter, cooling tanks, governors, &c. These are all connected up in the usual manner, with the exception that the lighting is arranged in seven groups, each group having its individual control. That is to say, each group of lamps is provided with its own supply-pipe direct from the compressing station; and on each pipe directly after it leaves the high-pressure main, one of the Keith special control governors is fixed, having a small pipe-connection with a switchboard. In this way, complete control is given of the whole series of lamps on the one supply-pipe by the simple movement of a $\frac{3}{8}$-inch cock. When the cock is in the "Off" position, and either high or low pressure gas is at the inlet to the governor, the governor outlet is at low pressure for supplying gas to the pilot-lights. To allow high-pressure gas to pass (when the compressor is running) and light the lamps, the cock is placed in the "On" position, which puts the governor out of action. The accompanying illustration



View Showing the Lighting of the Central Hall.

shows the control cock close to the governor; but, of course, it is quite immaterial at what distance away the cock is fitted, as it is merely a matter of running a small tube. In the present case, these cocks are all assembled on a switchboard situated in the compressing house; and this switchboard, it will be remembered, was spoken of by Mr. Broadberry in very favourable terms. It will be seen by the drawing that there are ten "points;" and this allows for an addition of three to the seven existing groups of lamps. Among the portions—and they include the principal parts—of the Palace now lighted by the high-pressure installation may be mentioned the Central Hall, the Bazaar, the Exhibition Hall, the Skating Rink, the North Terrace, and the South Terrace. It will thus be seen that the lighting is not confined to indoors; and, in fact, there is every reason to hope that ultimately the whole of the lighting, both of the buildings and the grounds, will be carried out on the same system. For this, no enlargement of the present compressing plant will be needed.

The gas is supplied at a pressure of 4 inches of mercury; and everything is of the Keith-Blackman Company's latest pattern. The majority of the lights—about one hundred in number—are of 500-candle power; but there are twelve of 1500-candle power. Four of these big lights (as shown in the photograph) are in the Central Hall; while there are six in the Skating Rink, and two outside the Palace. All the lamps for lighting the interior are fitted with side hexagonal screens, supported on the outer edge of the ordinary shade; and globes are entirely dispensed with. This arrangement not only gives a pleasing effect, but at the same time it materially reduces the maintenance charges.

In conclusion, it may be remarked that the installation (which has been in operation for about two months) is not claimed to give an exceptionally brilliant lighting effect. What is urged for it—and there is no fear of the justice of this contention being denied—is that it is a demonstration of practical lighting sufficient for all possible requirements at a minimum cost.

BRITISH AND GERMAN RETORTS.

By W. R. Herring, M.Inst.C.E., of Edinburgh.

In view of the interest attaching to this subject, we are pleased to publish the following notes communicated, in compliance with a suggestion, by Mr. W. R. Herring.

There is still a good deal to be said with regard to the causes affecting the durability of an ordinary gas-retort; and it must be admitted that but few data have, so far, been given that will enable a fair judgment to be arrived at. The durability of the retort of necessity depends as much upon the method of setting, the type of setting, and the materials used in the setting, as it does upon the materials used in the retort itself, as well as its after-treatment when in use.

I cannot illustrate this better than by pointing out my own experiences with first-class materials in Edinburgh. In former days, in the old works, using exactly the same materials as we use now, each 20-feet retort yielded, on an average, 354 days of work with only minor repairs, representing 700 tons of coal carbonized during its life; whereas at the present time the same materials used in the inclined retort-settings are giving a maximum life of 1335 days and an average life of 1200 days, representing six times lighting-up and letting-down, with a tonnage of coal per retort during its life of 2336 tons at a maximum and an average of 2100 tons. In both cases only minor repairs, such as pointing-up, have been indulged in.

The horizontal settings at the old works were settings of eights, machine-charged for the greater part of the year, set over regenerative furnaces, and carbonized 33 cwt. of coal per day. The inclined settings at the new works are settings of nines, set over regenerative furnaces, and carbonize 35 cwt. per day.

As to the type of setting. On the Continent, settings of nines are universal, or nearly so—that is to say, there is no large combustion chamber, nor are there cavities in the setting, which I have always maintained is a constructional weakness. The Edinburgh inclined settings are also settings of nines. I think I am also right when I state that the general type of setting in the South of England has a large Gothic arched or other form of combustion chamber, which I have always looked upon as a weak constructional feature. Then, again, the number of cross walls in a setting, the substance of the walls, whether they are 4½-inch or 9-inch, and their distances apart, necessarily affect very materially the life of the retort; and it is only by taking into account the whole of these data that any proper basis of comparison can be arrived at.

The incidents of lighting-up, and the care exercised in regular working, letting-down, standing-off, and the care with which all repairs are carried out, have a most material influence upon the life of the retort; to say nothing about the fatal influence of allowing fire-clay material to become saturated with rainfall before being set or laid.

There are a great many data that should be compiled, and perhaps the Committee now considering the fire-clay question could enlarge their sphere of operations in this respect. But after all, we must not lose sight of the fact that the mere lasting ability of a retort is not everything. Many a setting of otherwise good retorts fails in consequence of choked flues or occasional local heating in a part of the setting that cannot be conveniently got at without pulling out at least some of the retorts.

Personally, I do not believe in repairing retort-settings where it is necessary to introduce new parts, as I am satisfied that it is cheaper to sacrifice the retorts and reset, as most of the bricks are again usable, and, in fact, preferable to new ones. The loss in gas production and carbonizing capacity owing to a defective setting is so much greater in money value than the actual cost of resetting, that nobody who keeps a continuing eye on the cash economy of the undertaking will hesitate to sacrifice a defective setting.

So far as my own experience goes, both in England and in Scotland, and also with Continental material, I am confident that retorts at the least fully equal to German manufacture can be procured from a few makers; and I am not disposed to admit the apparent hopelessness of the position so far as British retorts are concerned. I have always found retort-makers willing to adopt any suggestions that may be given them in the manipulation of their material for special purposes. At the same time, it must be admitted that there is considerable room for the application of methodical scientific methods in the preparation of fire-clay goods for the many different purposes for which they are now used, as what is advantageous to its application for one purpose is detrimental in another.

As regards vertical retorts, the experience in the shale-works in Scotland is that their durability depends primarily upon their power of resisting the frictional passage of the material through them; and although at the outset they are from 4½ to 6 inches thick, they are not renewed until they are about 2 inches. Twelve, fourteen, and fifteen years is a normal life; and there is no reason why a coal-gas retort constructed on similar lines should not last as long—excepting, perhaps, the upper portion, where the fluids resulting from carbonization are naturally greater, and may be more destructive to the fire-clay retort in the upper parts, which does not take place in the oil-retorts, as the upper section with them is of iron.

FLICKER PHOTOMETER AND THE EYE.

At the Meeting of the Physical Society last Friday, Mr. J. S. Dow, B.Sc., who is associated with Mr. Leon Gaster in the editorial department of the "Illuminating Engineer," read a paper on "The Physiological Principles underlying the Flicker Photometer." It furnished a more complete account of the researches that formed the subject of the article in the above-named publication which was summarized in the "Journal" for the 2nd inst. (p. 319); and, taken in its entirety, it is a valuable contribution to the literature of the subject.

In a paper read before the Society in 1906, the author discussing some of the phenomena of colour vision which affect heterochromatic photometry referred to the theory, due to von Kries, of the action of the minute light-percipient organs on the retina known as the "rods" and "cones," which is now applied to explain the "yellow spot" and Purkinje effects. It was pointed out that, when the comparison of two sources of light differing in colour was attempted, the reading of a photometer of the "equality of brightness" pattern would be found to depend upon the obliquity at which rays from the illuminated surfaces strike the eye, the distance of the eye from the surfaces, and the size of the surfaces. It was, however, also found that, for some reason, the effect was much less readily perceptible in the case of a flicker photometer; and this suggested that the physiological basis of such instruments might be found to differ from that of photometers of the ordinary variety.

In his later communication, the author summarized the results of further experiments on this point which seem to throw some light on the theory of the flicker photometer. He first of all recapitulated the main points in the theory of the action of the rods and cones on the retina, and afterwards made a comparison of the yellow-spot effect fore quality of brightness and the flicker photometer. This instrument was then considered in connection with the Purkinje effect; and then the author passed on to deal with the theory of the "rod-flicker" and the "cone-flicker"—the former being the sensation received through the rods, and the latter that received through the cones. Following this came a few remarks on colour-blind observers and the flicker photometer, in which it was pointed out that in some cases colour-blind individuals have been observed to obtain correspondingly abnormal results with both flicker and "equality of brightness" photometers; and the author said that it would lead one to doubt the soundness of the principle underlying such instruments if this were not the case.

In his concluding remarks, Mr. Dow said he was conscious that the data presented in his paper were in many respects incomplete, and that other and more adequate experiments were needed before any decision as to the correctness of the suggestions brought forward could be taken. For instance, the results described were, like those contained in previous papers, obtained for the author's eye only. For this reason they were strictly comparable with the latter, and in some respects seemed very consistent. But he pointed out that, in order to be conclusive, experiments in photometry should be based upon observations

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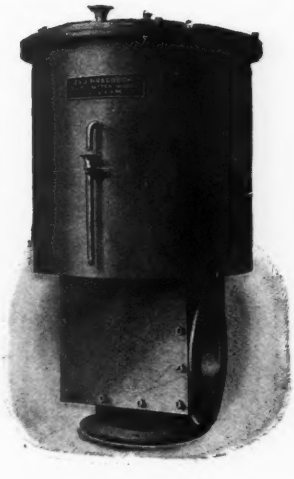

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PALATINE WORKS, WARRINGTON.

made by a large number of individuals, and upon a number of different types of instruments. His experiments were mainly carried out at the Central Technical College, South Kensington, during 1906 and 1907; and he had hoped to make the series of researches described in this paper somewhat more complete. As circumstances had prevented this, however, it occurred to him that their present publication might lead others to investigate the phenomena described more closely from the standpoint of photometry; and the need for gaining some insight into the physiological facts underlying the flicker photometer might, perhaps, give these experiments a certain suggestive value. The author acknowledged that the problem investigated was so essentially physiological in character as to be strictly only capable of being adequately studied by the combined efforts of the physiologist and the physicist interested in the problem from the photometrical side. Many points in connection with the theory of the action of the rods and cones on the retina (only the main essentials of which were referred to in the present paper) seemed to be still the subject of much discussion among physiologists, to whom Mr. Dow tells us we must look for the exact interpretation of their bearing on problems in photometry.

MILNE'S GAS FITTINGS AND LAMPS.

THERE are some firms who have a reputation for superlative quality and finish in connection with the goods they produce, and which quality and finish have, of course, to be paid for. But with the extension of gas lighting to smaller sized property—to the cottage and the tenement—there has grown up a considerable demand for a class of fittings that cannot possibly stand the extra costs that the higher types in design and finish must necessarily

involve. Among the firms who have recognized this are Messrs. James Milne and Son, Limited; but looking into their London show-rooms (at No. 59, Farringdon Road), it is seen that, in the cheaper lines of fittings that they now make, they eschew any notion that the middle-class resident in flats or the artizan in the best room of his cottage should be condemned, because his means are small, to a creation of ugliness in metal for use as a gas-fitting. We see some effective designs in low-priced fittings—pendants and brackets—the quality and finish of which will pass the most critical of eyes. So decidedly has the fashion turned from the upright to inverted gas-burners that, in this line of new fittings (of which samples are illustrated), the designs are almost exclusively for the latter burners—the large or small size. In these cheaper lines of fittings, too, the demand in another respect follows the higher class goods—oxidized copper going better than anything else, solely on account of the reduced active influence of the heat of the flame and the products in producing discoloration. There are special fittings for the bijou form of burner; but the firm are of opinion that the popular burner of the future for domestic purposes will be the bijou size. Brackets are made to match all the popular designs of pendants. One of the illustrations depicts a new design in hall lights, with a straight cylindrical globe, for the inverted burner. It is very effective.

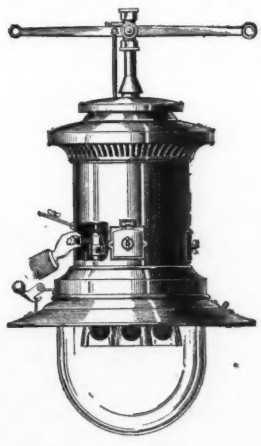
The firm, while trading generally in inverted burners, make a speciality of the "Milton" No. 2 (large sized) burner; and they are just placing on the market a cheap form which will be known as the No. 6 inverted. This is made of polished brass, and is very neat. In the crown there is a protecting cap of porcelain, which also diverts the products from a direct upward course, and so prevents contamination of the primary air supply. The injector is provided with a needle-regulator; and the head of the spindle working it is made of a non-heat conductor. An air-collar is provided for controlling the air supply; the bunsen tube contains a mixing-chamber; and the burner-nozzle and mantle carrier is a heavy one of refractory material, so that a long life shall be the portion of the burner. For these and other burners, glassware to suit all tastes is on view. The firm have a good range of outside inverted lamps, well made, and excellent in finish—the outer casing being in colours or black. The stocked lamps (which are known as the "Viaduct") are made for one to four burners; and their duty may be taken as approximately 125 candles for a consumption of 3½ cubic feet per burner. For both indoor and outdoor lighting, for inverted or upright burners, the firm's "Viaduct" mantles are securing largely extended patronage.

A great stock of all manner of fittings—large and small—is carried at the show-rooms, and it would be useless to describe any one sample in detail. The firm are laying themselves out more specially for show-room customers; and any gas company, ironmonger, or plumber are at liberty to send customers, with an order to supply goods, so that they may make choice direct from stock, under the usual conditions.

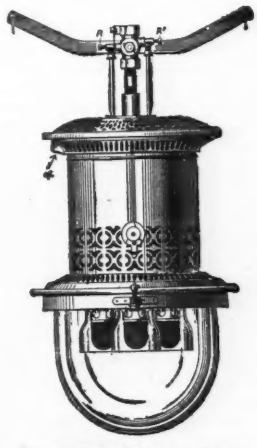
For country mansions beyond the reach of town-gas mains, the firm make special fittings and burners for use with acetylene or air gas. In this notice we have confined ourselves to the firm's lighting fittings; their other departments—dealing in gas meters, plant, and appliances of many descriptions—being devoted to what is in the nature of all-the-year-round business, while lighting is more of a seasonal affair, and that a present one.

THE "VENUS" GAS-LAMPS.

THERE are several points that can fairly be urged in favour of the "Venus" outdoor and indoor lamps, and which have combined to bring them an encouraging amount of favour from gas managers and others who have subjected them to working tests. This, of course, we have not done; but we have done the next best thing—inspected the lamps in operation at the extensive show-rooms of Mr. B. Cars, at No. 124, Tabernacle Street, E.C.



The "Venus" Outdoor Lamp.



The "Venus" Indoor Lamp.

The outdoor lamps are made in three, four, and five light sizes, and the indoor pattern from one to five lights; and a lighting efficiency of 125-candle power is claimed for each inverted burner, with a consumption of from 3½ to 4 cubic feet of gas per hour. The general construction of both patterns will be sufficiently gathered from the illustrations, and therefore it is unnecessary here to say anything on this head, except to remark that they are strongly made; while at the same time there is nothing about them which leads to high cost of production, and so it is possible to market them at extremely moderate prices. All the fittings are universal; and any kind of mantle of the necessary size can

be used—although, of course, Mr. Cars has his own well-known make of "Venus" mantles.

In the outside lamp, it will be noticed that there is a small door, giving access to the gas and air regulating arrangements. One of these doors is provided in connection with each burner. This, while not in any way interfering with the air-tight and the weather-proof qualities of the lamps, affords the readiest possible access in the event of any adjustment being required; and such facility is, it will be admitted, a decided advantage. With the indoor pattern, the gas and air regulation is accomplished from the outside. Both forms of lamp are provided with an external lighting arrangement as well as a permanent bye-pass flame, and are fitted with lever cock control. The outside lamp can be fitted with a single lever, which permits of the use of only one burner or the whole number. This lever is moved round, for lighting, until the temporary bye-passes become ignited through the permanent bye-pass; and another movement lights up all the burners and extinguishes the bye-passes. Should, however, only one burner be required, a still further motion is given to the lever, to its extreme position; and full lighting or complete extinguishing is, of course, secured by reversal of the motion. This renders the lamp suitable for the positions in which the full lighting effect is not always required, and where it is consequently a very great convenience to be able to turn on one or more burners as desired.

Gas v. Electricity for Cooking and Heating.

In the "JOURNAL" for the 26th ult. (p. 246), attention was called to a letter which was being sent out by one of the District Inspectors of the Gaslight and Coke Company, directing the consumers' attention to the many advantages of gas for the heating of business premises. He has followed this up with a circular setting forth more fully the arguments in favour of gas as compared with electricity. Without going deeply into scientific calculations, he shows that a unit of electricity is equivalent to 3410 B.Th.U., and that a cubic foot of gas as supplied by his Company is equal to 570 B.Th.U. Consequently, 6 cubic feet of gas will give as much heat as a unit of electricity, at the cost of one-fifth of a penny, compared with 1d. for electricity purchased at the lowest rate at which it is supplied for heating or cooking purposes. The writer of the circular cites, in support of his argument in favour of gas, the fact, which our readers will doubtless remember, that at an electrical exhibition a seven-course luncheon was cooked for 65 persons at a cost of 4s. 8d., for which 5 cwt. of kitchen coals or 1600 cubic feet of gas could have been bought. He thinks further comment is quite unnecessary.

Specific Gravity of Coal.

Herr O. Mohr has recently published, in a German journal devoted to brewing ("Wochenschrift für Brauerei"), the conclusions at which he has arrived from comparisons of the elementary composition and the specific gravity of a large number of different kinds of coal. While he finds that no simple relationship exists between the specific gravity and the composition, he nevertheless is able to draw the following conclusions: (1) The specific gravity of air-dried samples of the chief types of German and English coals lies between 1·27 and 1·45. (2) The specific gravity is affected by the proportions of water and ash in the coal and by its elementary composition. It generally is lower as the amount of carbon increases and as the proportion of ash decreases. (3) With dried coals the specific gravity increases as the proportion of carbon falls. A diminution of the proportion of hydrogen has the same effect. Coals containing a moderate amount of ash—*i.e.*, not more than 10 per cent.—have their specific gravity affected to a greater extent by the amount of carbon and hydrogen they contain than by the percentage of ash. (4) The composition of the coal substance does not appear to have any appreciable influence on the specific gravity.

A Name for the International Light Unit.

Further correspondence on this subject, to which reference was made in the "JOURNAL" for the 5th ult. (p. 50), appears in the current number of the "Illuminating Engineer." A writer who adopts the *nom de plume* of "Athos" considers that, for the present, it will be preferable to avoid attaching to the international unit the name of M. Violle or of any other scientist, however eminent. In his opinion, M. Blondel's suggestion that a Greek word, such as "pyr" or "phos," should be selected is the better plan. M. Laporte, the Sub-Director of the Central Laboratory of Electricity in Paris, thinks it desirable to await the time when we shall be in a position to propose a satisfactory international standard before attempting the solution of the question of a new name. Replying to the criticism of Mr. Clifford Paterson, M. Blondel remarks that the proposal to give the international unit of light a special name, as he suggested, has nothing in common with the question of the value of standards of light in general, nor with the value of the Violle standard in particular. He points out that it is the general rule, in the nomenclature of physical quantities, to utilize either a Greek term or the name of some celebrated man; and he says he is not aware of any argument which can be advanced to explain why we should depart from this practice, and adopt an expression denoting a material object solely in the case of the unit of light, especially when this term is differently expressed in the various languages involved.

SOME ASPECTS OF THE GAS INDUSTRY.

By J. G. NEWBIGGING, M.Inst.C.E.

The Inaugural Meeting of the current session of the Manchester Association of Students of the Institution of Civil Engineers was held last Wednesday, when Mr. J. G. NEWBIGGING, M.Inst.C.E. (the President), the Chief Engineer of the Manchester Corporation Gas Department, delivered an address, of which we reproduce the main portions.

Gentlemen,—In considering the choice of a subject for my address this evening, I must confess to have been in some difficulty in coming to a decision. But looking through the list of Past-Presidents, I found that although almost every branch of engineering has been represented, I am the first gas engineer to occupy the chair; and the occasion appeared to me to be an appropriate one to deal briefly with some aspects of the gas industry—an important branch of the public service.

It is only a few years since the Centenary of the discovery of gas lighting was celebrated. Prior to its introduction, attempts had been made in all ages to banish darkness by various primitive devices; and the problem had sorely perplexed mankind. But the discovery of gas lighting changed all this. The practical application of gas for lighting was first effected by William Murdoch, a working engineer, at his house at Redruth, in Cornwall, in the year 1797.

Interesting as is the history of the discovery epoch of gas lighting, from the researches of Shirley and Clayton on the properties of carburetted hydrogen or coal gas, to the time when Murdoch first applied it to practical use, and onward through the pioneer age, it is not possible in the time at my disposal to-night to dwell on this part of the subject. It is, however, of more than passing interest that I should briefly refer to the researches at the beginning of the Nineteenth Century of Dr. William Henry, contemporary and friend of Dr. John Dalton, founder of the atomic theory, the logical basis of modern chemistry.

Dr. Henry was born in Manchester on the 12th of December, 1774. His father, Mr. Thomas Henry, F.R.S., was a former President of the Manchester Literary and Philosophical Society, and was an ardent worker in chemical science. In 1797, Dr. Henry submitted to the Royal Society an experimental memoir with the object of re-establishing the title of carbon to be ranked among elementary bodies, in opposition to the conclusions of other eminent chemists. In 1803, he contributed a further communication to the Royal Society on the results of exhaustive experiments on the quantity of gases absorbed by water at different temperatures and under different pressures. This ratio of the quantity absorbed to the pressure supported the theory of Dr. Dalton that the absorption of gases by water is due entirely to mechanical agencies. In the year 1804, Dr. Henry delivered a series of lectures in Manchester demonstrating the method and facility of reducing gas from coal, and showed the advantages of its use as a means of obtaining artificial light. He afterwards analyzed its composition and properties; and in the course of his numerous experiments he produced gas from a variety of substances—coal, wood, peat, oil, wax, &c.—and endeavoured to arrive at the relative value of each description of gas for lighting.

From continued researches on the various compounds of hydrogen and carbon, Dr. Henry ascertained the constituents which contributed to the illuminating power of coal gas; and he propounded many suggestions tending to improve its production and purification, which have been of great value to the industry. He was a distinguished Manchester man, and a prolific writer on various scientific subjects. For these reasons, I have brought for your inspection one of his original note-books, in which are recorded the workings of a number of his experiments and investigations on gaseous compounds, and other chemical work, some of which were carried out in conjunction with his friend, Dr. John Dalton. The book came into the possession of one of the chemical staff of the Manchester Gas-Works some ten years ago.

It was not by the work of practical mechanical men alone that the progress of gas lighting was slowly but surely advanced. The gas industry—in common with many other industries—is indebted from its inception to distinguished chemists for their researches and discoveries in connection with gaseous compounds, and the utilization of the residual products of gas manufacture. Even the electrical industry owes something to chemists in the recent success in diminishing the consumption of current by over 50 per cent. by the use of metallic filament lamps as against the carbon filament lamp, which has saved the situation with regard to the employment of electricity for lighting.

The plea of Professor Armstrong, the President of the Chemical Section of the British Association, in his address at Winnipeg last August—for the greater co-operation of the engineer and chemist—is one that might be taken to heart with advantage in the conduct of many industries where the research work of the chemist is essential to the practical work of the engineer.

The progress of the gas industry since Murdoch's time is one long record of unbroken success. During this period, it has served its ever-increasing *clientèle* efficiently, and yielded the investors in its stock a good, steady dividend—probably unequalled by that of any other industry carrying on operations on such a large and extended scale; and it has played no small part in contributing to the comfort and welfare of the community.

On the advent of the practical application of electricity to lighting in the early eighties, and even down to more recent times, there have not been wanting critics who, through lack of knowledge, have predicted the decay of the industry. But to-day there are many proofs of the stability of gas enterprise. To name only a few of these:

1—The Stock Exchange estimate of the value of gas stock.
2—The desire of local authorities to obtain possession of private gas enterprise in their districts.
3—The ever-increasing demand for gas, not only for lighting and other domestic uses, but for industrial purposes.

To those of you who have not a close acquaintance with the extent of the industry in the United Kingdom, it will be of interest to quote figures from the last "Parliamentary Returns" dealing with the year 1907, and compare the growth from the year 1897—a period of ten years. There are in the United Kingdom 771 authorized gas undertakings, of which 495 belong to private companies and 276 to local authorities. The position in 1897 and 1907 is shown in the following table:—

	1897.	1907.	Increase Per Cent.
Capital authorized	£92,111,252	£150,907,311	63
Capital expended	£69,745,300	£113,865,050	63
Receipts	£20,207,453	£30,067,752	44
Working expenses	£14,981,527	£22,724,104	51
Gross profit	£5,225,926	£7,343,648	40
Tons of coal carbonized	12,616,153	15,466,753	22
Cubic feet of gas sold, in thousands	122,219,674	172,889,147	41
Length of mains—miles	25,157	33,536	33
Number of consumers	3,025,376	5,665,176	87
Number of public lamps	553,803	700,264	26

In addition to the capital invested in statutory gas companies, about £6,000,000 are invested in non-statutory gas companies—that is to say, companies working under arrangement with local authorities and not under Acts of Parliament. These companies use about two million tons of coal—making the total quantity used for gas making in the United Kingdom over 17,000,000 tons per annum.

Looking at the progress made in another way, the gas industry has doubled its business in twenty years. This expenditure on gas enterprise has given rise to vast industries, employing a multitude of workers, which have been brought into existence during the last quarter-of-a-century in the production of apparatus for the utilization of gas for cooking, heating, and motive power.

During this period (1897-1907), the electrical industry has expanded in a no less remarkable degree. In 1897, the number of English electrical supply undertakings was 115, with a capital of £10,157,109; while in 1907 the number had increased to 474, with a capital of £78,554,506. Parliamentary returns are not issued in connection with electricity in the same form as for gas; so it is impossible to analyze the working of electrical undertakings with the same completeness as gas undertakings. It will, however, be of interest to give you some figures showing the growth of electricity in Manchester, which is typical of the progress made in other large towns. Electricity was first supplied in Manchester on the 31st of July, 1893; and the progress is shown in the following figures for the year ended March 31, 1909:—

	Electricity.		Gas.
Capital employed	£2,568,993	..	£2,781,635
Total income	£367,240	..	£761,363
Total expenditure	£355,240	..	£735,256
Total units or cubic feet sold	66,924,864	..	5,380,025,000

Notwithstanding the remarkable development of electrical supply in Manchester, the increases in connection with the Gas Department during the same period have been as follows:—

Capital employed	90	per cent. increase
Income	40	,, ,,
Expenditure	42	,, ,,
Gas sold	55	,, ,,

The progress made by the gas industry during the ten years under review is all the more notable when it is remembered that the competition with electricity has been of the keenest character for many of the uses to which gas had, previous to the introduction of electricity, no serious competitor; and it is demonstrative of its resourcefulness and adaptability to competition.

It must be remembered that, as far as artificial lighting is concerned, not only was it handicapped in having to share any future development in this direction with electricity, but lost a considerable number of its most profitable consumers, who were attracted by the new-comer. It is true that during the last twenty years—particularly during the latter half of this time—the gas industry has made great strides in raising the duty of its main product (gas) as an illuminating agent, through the discovery of the application of the rare metallic earths, in conjunction with the mantle, to lighting, from an efficiency of 3 to 5 candles per cubic foot of gas consumed to 60 candles per cubic foot with high-pressure lighting. But for this, there is no doubt that the industry would not have maintained the position it has done in the race for supremacy proceeding between gas and electricity.

There is room, however, for the expansion of both industries in every direction; and in the case of municipal ownership of both in the same city or town, it is essential that they should be worked in friendly rivalry for the benefit of the general body of citizens—the one not being over-burdened more than the other, or receiving preferential treatment.

The question as to whether the municipalization of gas enterprise is in the best interests of the community, is one on which there is great divergence of opinion. Its success attracted the attention of local authorities in the fifties; and the transfer of undertakings continued to grow up to the nineties—the only falling off being in the eighties, when there was some apprehension as to the effect of the electric light on the industry. During the twenty years ending 1907, the number of gas undertakings so transferred amounted to over 100.

It is argued by the advocates of municipalization that undertakings requiring the use of streets should be under the control of the local authority; and there is reason in this view. Some years ago, a statement was prepared to show the magnitude of the evil and the inconvenience to the public in the Metropolis, where the services of gas and electricity and water (the latter since municipalized) were in the hands of different Companies. It was found that in every mile of street in each Metropolitan borough there were no fewer than from 30 to 139 openings made every year; and investigation proved that the evil was much less pronounced where these services were municipalized.

This phase of the question is not, however, in itself a sufficient reason for the transfer of such services to public control. There must be something more than that. The great principle underlying the municipalization of any industry or commodity is, or should be, that it will give to the community a cheaper, and at least equal, service to that obtained under private enterprise; and unless this is achieved, it is not justified. The cheaper service—if a trading concern—cannot be secured unless it is allowed to conduct and extend its business with the same freedom from restraint which characterizes private enterprise; and this unfortunately does not always obtain. Without these conditions, municipal gas enterprise can never be as successful or as satisfactory to the consumers as private gas enterprise.

The advantages of manufacturing coal gas at a low works' cost, which can be effected at from 6d. to 1s. per 1000 cubic feet into the gasholder (according to local conditions), are rendered futile unless its subsequent distribution to the consumers is unfettered and characterized by strong commercial methods.

One of the greatest evils of municipalization is the transfer of gas profits in relief of rates; and the question has been a fruitful source of controversy for a generation past. It is a pernicious system of indirect taxation, which has been allowed to eat itself like a canker into this branch of the public service, in such a manner as to be well-nigh incurable in these days of advancing rates. But if it is not soon eradicated by the surgical knife of public opinion, it will cause irreparable injury to an important industry. Municipal gas undertakings have been too long the milch-cow of the ratepayers; and unless a broader and more enlightened policy is adopted, and that quickly, it will find its Nemesis.

To illustrate this evil, I give you some figures relating to the Manchester Gas Department for the year ended March, 1909—

Total expenditure on manufacturing and distributing plant	£2,781,635
Total liabilities	1,515,275
Total amount applied in relief of rates from 1844 to 1909	2,918,585

The sum applied to relief of rates exceeds the total expenditure on the undertaking by £136,950. These figures speak for themselves. What possibilities this sum of nearly three millions of money would have opened out for the supply of cheap gas, for which everybody is crying out nowadays to assist in purifying the atmosphere, if it had been diverted in the right channels!

It is argued by the supporters of applying gas profits in relief of rates, that money is borrowed at a cheaper rate for the purpose of municipal enterprise than would otherwise be the case; and that, in the event of obsolescence of any particular enterprise through the advance of science, the ratepayers should be recompensed for the risk by taking a share of the profits. If the possible obsolescence of gas—or, for that matter, of electricity—can be seriously entertained for one moment, then the large sums of money which are extracted, from gas undertakings particularly, year by year (and spent) is utterly wrong. These annual sums should be invested, and the interest of such investment only expended from year to year in relief of rates; the capital being at any time available to meet the liquidation of the department in case of obsolescence, because the assets would not realize the value appearing in the accounts—practically only the value of the land. If this principle is not carried out, the position of the advocates of relieving rates out of gas profits is untenable.

It is evident from a decision of a House of Lords Committee in the case of the Salford Gas Bill in the last session of Parliament, that a great change is coming over the view of the governing authorities in regard to this matter; and municipalities will in future be compelled to look elsewhere than to gas undertakings for funds in relief of rates. Through this decision, the Salford Corporation were limited in their contribution to the relief of rates from their gas undertaking to an annual sum equal to 1 per cent. on the existing debt, or about £6000, against a sum of about £24,000 which they have been accustomed to apply for the purpose. The Corporation withdrew their Bill, which is much to be regretted in the true interests of municipal gas enterprise.

Municipal authorities in Scotland are not permitted under the Burghs Gas Supply (Scotland) Acts, 1876 and 1893, to make any profit on their gas undertakings, but must adjust their finances from year to year so as to give a cost-price supply. This is a reasonable piece of legislation which might with advantage be extended to the whole of the United Kingdom.

The system of applying gas profits in relief of rates has been one of the most potent arguments against municipal trading; and it would be well for those advocates of its extension to devote their energies to the removal of this stigma before they can hope for any success in extending its scope. The question after all resolves itself into one as to which is best for the community—a cost-price supply, or a price at which a profit can be made for the relief of the rates; and the feeling is certainly growing that the former is the best policy.

Well now, our chief interest lies in the future of the gas industry, and how it can best be utilized in the service of mankind. With this millstone of contributing to the relief of rates removed from its neck, as regards municipal undertakings, and under careful management, it is destined to play an important part in assisting in the elucidation of one of the most pressing social problems of the day, by the extended use of the gaseous and smokeless solid fuels which are the main products of gas manufacture. These problems are not only important ones from our point of view as ordinary citizens, but are of equal importance from our special standpoint as engineers, in the conservation of the energy which Nature has so abundantly bestowed upon us in our coalfields, and in assisting in the reduction of smoke which has such a deleterious effect on the health and the comfort of the people, and on the architectural and engineering work in all our great cities.

An eminent divine recently said that the solution of social problems was in the hands of religion and science. It is certain that the physical well-being of the community is largely in the hands of practical scientists known as engineers, rather than in the hands of scientific dreamers and theorists. We are indebted to these men for pointing the direction in which engineers should apply their practical experience; but they are themselves often unpractical. Some of them are too ready in expounding their views, after the methods adopted by the penny showman, on such subjects as the near exhaustion of our coal supply—telling us of the terrible calamities that will befall us in consequence, and speculating as to our future source of heat and power.

These statements may be all very well to provide startling headlines for the newspapers; but they are of no real value to anyone. What we require are practical suggestions. What the future source of heat and power will be, will resolve itself in due course in the natural order of things. The important question to us is, whether we are utilizing our present resources in the most advantageous and economical way. If we are not doing this, we are not only injuring ourselves but future generations as well. We have no right to use 2 lbs. of coal to do the work of 1 lb.; and all our scientific work and energies should be turned in the direction of using coal to the very best advantage.

In this connection, a great deal of excellent work has been done by mechanical engineers, during the last quarter-of-a-century particularly, in economizing the consumption of coal, by the great improvements effected in boilers with their accessories, and in the steam-engine. Forty years ago, something like 7 lbs. to 8 lbs. of coal were required per horse-power-hour in the then steam-engine. The compound engine reduced this to about 5 lbs. per horse-power-hour. Following this was the triple expansion engine, with its consumption of 3 lbs. of fuel or less per horse-power-hour. And now we have the steam-turbine, with a consumption of less than 2 lbs. per horse-power-hour. Whether any further improvements will be effected, and the highest possible efficiency reached with a perfect steam-engine, no one can foretell.

In the same way, great economy has been effected in the improvements in internal combustion engines. In the Lenoir gas-engine of 1860, 100 cubic feet of gas were required per horse-power-hour. Now the same work can be done with 15 to 16 cubic feet of town's gas; and it is hoped that the labours of those who are working in the direction of further improvements and economies in internal combustion engines may be rewarded with success.

The reduction of loss of heat by radiation through the cylinder walls, and that carried off in the exhaust, and the evolving of some form of turbine motor actuated by gas, are among the problems which will ultimately be solved. The achievements of mechanical engineers are such that those associated with them may well feel proud, and why should not these economies be secured in other directions? The field is only limited by the number of purposes to which coal can be employed as the basis of heat and power.

In the consumption of fuel for household purposes, we stand practically where we did a century ago. Sir Oliver Lodge aptly described our existing fuel practice as the "uncivilized and essentially savage method of heaping a pile of crude coal together and setting a light to it." In doing this, not only are we creating a weapon of discomfort and destruction in the shape of smoke, but are wilfully wasting valuable products in the coal.

One speaks of the smoke problem with some hesitancy, as it has been discussed over and over again from almost every point of view; but as we live in a city reputed to be one of the smokiest and grimiest in the kingdom, the subject cannot be too often ventilated, if by this means we can contribute our quota towards its solution. And it is to engineers—particularly those associated with gas and electrical enterprise—that relief from this burden must be mainly looked for.

The law with regard to the smoke nuisance should be made so rigorous as to preclude the possibility of manufacturers (or even householders) using any kind of fuel in such a manner as to produce black smoke. But it is useless, and would be damaging to the trade of a district, to frame such laws without first providing the community with a substitute which can be shown to be at least as economical as the smoke-giving fuel they are at present using. In the case of manufacturers, there are a number of excellent appliances available in connection with the firing of steam-boilers, which, if intelligently used, would tend to mitigate the evil. But as these appliances need controlling with a certain amount of technical skill, which is not available in every works, they are often discarded after a time as being too troublesome; and a return is made to the old smoke-producing methods.

It is a question, however, whether manufacturers are as great sinners as householders in the production of smoke. In Manchester, for instance, it is estimated that from 700,000 to 800,000 tons of solid fuel (mainly bituminous coal) are used per annum in domestic fires. If all this smoke-yielding material could be replaced by gaseous fuel, solid smokeless fuel, and electricity, what a change would be effected in the atmospheric conditions in Manchester! Some idea can be gained as to the extent of the change by observing the conditions of the atmosphere on any Sunday in the centre of the city, when the consumption is largely diminished. Every foot of gas consumed, and every unit of electricity used for other purposes than lighting, and every pound of smokeless fuel burned, will bring us nearer to relief from this thraldom of smoke, and effect economies in our natural resources of heat and power; and it is our duty to encourage in every possible way their extended use. The best way to do this—in fact, the only way—is first of all to give these commodities to the public at the very lowest possible price, and, secondly, to provide efficient apparatus to enable them to get the best results from their use.

In ordinary town's gas we have a fuel at our command which, with proper appliances, will do perfectly, and without nuisance, all the heating required in domestic service—including fires, cooking, bath heating, washing, ironing, clothes drying, &c.; while for workshop use it is unequalled by any other fuels. Failures do occasionally occur in the application of gas to domestic and workshop purposes; but these failures are due largely to want of knowledge and experience in the men who supply and fix the apparatus. For this reason, such work should be entirely in the hands of Gas Departments, where officials with special knowledge and experience are employed; and unless it is in such hands, the use of gaseous fuel will not increase as rapidly as it otherwise would, or give complete satisfaction to its users.

In the direction of improving apparatus for the consumption of gas for household and industrial purposes, great progress has been made in recent years. This is evidenced by the increasing use of gas for other purposes than lighting; and still further improvement is confidently looked for from the labours of the various Gas Institutions, and the educating influence of the Chair of Fuel and Gas Engineering which has recently been founded at the Leeds University.

The gas industry has not received from the various Universities the attention it is entitled to, considering the wide use of its main product and its great possibilities. But this has been partially remedied by those connected with the industry in the raising of a fund to endow the Leeds Professorship of Fuel and Gas Engineering in memory of the late Sir George Livesey, who was a member of the Council of the Institution of Civil Engineers at the time of his death last year. Professor Arthur W. Bone, F.R.S., D.Sc., is the occupant of the Chair; and the research work which is being conducted under his direction cannot but result in the better application of gas for all the uses to which it is so eminently adapted.

Manufacturers of apparatus for the utilization of gas for lighting, heating, cooking, and industrial purposes, have realized that these appliances must be produced under the guidance of highly-trained technical men; and it is a rarity nowadays to find these works without such a staff, and thoroughly equipped experimental laboratories.

As an instance of how the encouragement of the extended use of gas can replace smoky fuel, we have only to look at our own city of Manchester. A few years ago the charge for the hire of cooking stoves was abolished; and the price of gas for gas-engines was reduced to 1s. 9d. per 1000 cubic feet. Up to that time, the quantity of gas used for these purposes was comparatively small; but now it is equal to the replacement of at least 50,000 tons of solid fuel per annum—mainly bituminous coal, which otherwise would have been used in open fires and polluted the atmosphere with its smoke. And this replacement of solid fuel is being augmented year by year. If this can be effected with gas at 2s. 3d. per 1000 cubic feet for cooking, and 1s. 9d. for power, how much more could be done if the price were reduced to 1s. or 1s. 6d. per 1000 cubic feet! An attempt was made recently to encourage the use of gas for the heating of offices in the city, by the letting out on hire of gas-fires at a small rental. This would, without doubt, have resulted in the replacement in a very short time of at least another 50,000 tons of coal. But the proposal was vetoed by the City Council under the erroneous impression that it would injure private enterprise. This much-desired reform is, I hope, only temporarily postponed.

With the removal of the impost on the Gas Department in Manchester of the contribution to the rates, and under a strong commercial policy, the price of gas could in a very short time be reduced so as to supply consumers for all purposes at 1s. 6d. per 1000 cubic feet; and its extended use would eventually make it possible to reduce the price still lower.

Parliament, in its wisdom, has in many recent instances decreed that the standard illuminating power of coal gas shall be 14 candles; and when undertakings are under compulsion in their Acts to supply a higher power, they have only to ask that they shall be permitted to distribute this lower quality, and, in spite of any arguments that may be adduced in opposition, it is granted without demur. In one case—that of the Gaslight and Coke Company of London (the largest gas undertaking in the world), a standard of calorific value has also been fixed—viz., a minimum of 500 B.Th.U. per cubic foot; and doubtless in course of time the illuminating power standard will be abolished throughout the kingdom, and a calorific standard substituted.

The justification for this is that the great bulk of town's gas is now consumed in bunsen burners for incandescent lighting, heating, and motive power; and the calorific power is, of course, the proper guide to its value for these purposes, rather than its illuminating power. Well now, provided that the whole of the saving effected in reducing the illuminating power of gas is given to the consumers in a reduction of the price, that a change is made in the pressure at which gas is distributed throughout the whole canalization of the district of supply, and the general use of flat-flame burners is discontinued, there is not much to say against the proposal to supply such low-power gas as that of 14 candles; but to reduce it to this low standard without these changed conditions would be to inflict injury on consumers.

Gas is ordinarily distributed at such a pressure from the works as to maintain at the consumers' premises a pressure equal to a column of water 2 to 3 inches high. But if this were increased to (say) 12 inches, it would largely neutralize the effects of a reduction in quality, and increase its efficiency for the bulk of purposes to which it is applied.

The effect of subjecting gas to such high pressure is to concentrate the flame into a small bulk of increased temperature; and this is what is required in the case of an incandescent mantle, and for most industrial purposes.

It appears to me that this question of generally distributing gas at high pressure at a low price, is the direction in which gas undertakings must look to maintain their prosperity, and increase the usefulness of their prime product. This system will, I have reason to believe, be put to a practical test in a district not far from Manchester.

A suggestion (by no means new) was recently made by an eminent scientist that gas-works should be erected in close proximity to the coalfields, and cheap fuel gas distributed to the great cities. Anyone with practical knowledge of gas manufacture and distribution knows perfectly well that such a scheme would not be a success from an engineering and commercial point of view; so the suggestion may be dismissed as worthless.

Even electricity works and gas-works cannot be said to be free from blame as smoke producers; but in the case of the former the gas-engine bids fair to oust the steam-engine in the production of electrical energy. In the latter, the continuous carbonization of coal in vertical retorts, with a total absence of smoke, is likely ere long to take the place of the older methods. Although Murdoch, the discoverer of gas lighting, attempted to distil coal in a form of vertical retort, it is only within the last two or three years that the system has become a practical success.

The dream of gas engineers has been to distil coal in a continuous manner so as to replace the present methods of intermittent carbonization in horizontal and inclined retorts, which necessarily result in much loss of gas and other valuable products through the periodical opening of the retorts for the purpose of discharging and charging, and also to bring the distillation process more in line with its subsequent purification process, which is practically continuous. The coal is fed into the top of retorts, 20 feet long, fixed vertically; and passing through at any desired speed—usually from 2½ to 3 tons per 24 hours—according to the class of coal used, it gives off its vapours during its passage through the heated retort, and discharges the coke at the bottom. The whole process is worked automatically by the simplest of mechanical contrivances, and requires the minimum of attention. This new system increases the yield of gas, tar, and ammonia, per ton of coal, over the present systems, mainly through the absence of waste, and gives a coke of much better quality. By these improved methods of manufacture, the gas industry is doing its share in the direction of economizing our coal supply, and setting an example to other industries in carrying on their manufacturing operations without smoke nuisance.

One more suggestion in regard to municipal gas and electricity in large towns. Considerable economy would result by these undertakings making an extensive use of each other's productions at a cost price supply. There is no reasonable argument in favour of electrical undertakings under such circumstances commencing the manufacture of power gas, for the generating of electricity with gas-engines, with its large expenditure of capital, when gas plants are already in existence—particularly when the works are contiguous, and from which a supply could be obtained at a price at which they could not produce it themselves, when every circumstance is fairly taken into account. Again, electrical power is being largely adopted in gas-works for mechanical stoking in carbonizing plants, the transport of coke, and for other purposes; and there is no reason why such undertakings should commence the generating of electricity. There could, in fact, be in many cases a reciprocal arrangement which would not only be to the advantage of the departments concerned, but to the ratepayers generally.

Well now, having given attention to some means by which gaseous fuel might be brought into more general use, I should like to refer briefly to some of the solid smokeless fuels. The President of the Institution of Gas Engineers, in 1885, made a suggestion in the course of his address that, instead of coal being used direct for household and industrial purposes in large towns, it should first of all be taken to the gas-works and purified from its smoke-producing ingredients. By this means not only would the smoke problem be solved, but many valuable products would be recovered which are now lost.

Mr. Thomas Parker, the inventor of "Coalite," seems to have had this idea in view when he introduced his invention to the public about two years ago, and which attracted so much attention. He claimed that by first converting the fuel now consumed for household purposes into coalite, this country would be enriched by many millions sterling per annum. He estimated that 34 million gallons of motor spirit, a similar quantity of solvents and enriching and burning oils, 238 million gallons of fuel oil, and 1,700,000 tons of pitch, would be recovered by his process of distillation, which are now lost up the domestic chimney. A system with such economic possibilities claims our attention.

In the distillation of coal for the production of illuminating gas, the heat of the fire-clay retorts in which it is placed is maintained at about 1800° Fahr., and from 11,000 to 12,000 cubic feet of gas are produced, of an illuminating power of 16 candles. For the production of coalite, the retorts are made of cast iron, consisting of a nest of twelve vertical tubes to each retort, each tube being 9 feet long and tapering from 4½ inches at the top to 6 inches at the bottom, to facilitate the discharge of the coalite at the end of the period of distillation, which is three hours (against six hours in ordinary gas making). The retorts are maintained at a temperature of about 750° Fahr., and the production of gas is from 5000 to 6000 cubic feet, of an illuminating power of over 20 candles.

The only material difference between the composition of ordinary gas coke and coalite is that the former contains 2 to 3 per cent. of volatile combustible matter, as against 12 to 13 per cent. in the latter. The effect of this is that coalite is more inflammable than ordinary coke and can be lighted in the usual way in a domestic fire grate almost as readily as coal. On the other hand, coalite is retailed at about three times the price of ordinary coke—viz., 30s. per ton.

The ordinary gas-works coke has not received the attention it deserves as a fuel for household use. In many districts it is broken into suitable sizes for various uses, and thus commands a ready sale. Its lack of easy ignition when used alone has, however, been its greatest drawback, though certain processes have been recently introduced which remedy this objection.

The following is an analysis of coke and coalite as purchased in the open market, and of a sample of high-class Yorkshire Silkstone coal nuts, showing the difference in their composition.

Result of Analysis of Yorkshire Silkstone Coal Nuts, Coalite, and Gas-Works Coke.

	Coal Nuts.	Coalite.	Coke.
Moisture	1·15 per cent.	3·27 per cent.	9·85 per cent.
Ash	8·15 ,,	10·17 ,,	13·47 ,,
Sulphur	1·67 ,,	1·927 ,,	2·72 ,,
Volatile combustible matter	31·12 ,,	12·60 ,,	2·89 ,,
Calorific matter, B.Th.U. per pound of fuel	13,500 B.T.U.'s	13,000 B.T.U.'s	12,400 B.T.U.'s
Evaporative value, pounds of water per pound of fuel	13 96 lbs.	13·44 lbs.	12·82 lbs.
Comparative efficiency	100 per cent.	96·27 per cent.	91·83 per cent.

Coalite is deserving of greater attention than, I fear, has been given to it. Although one ton of the material is capable of doing more work than one ton of coal in actual practice, and is therefore of greater value, I am afraid the extra price will militate against its general adoption. Unless the producers of this material can see their way to sell it at the same price as coal, or thereabouts, it will never be largely used, which is a matter for regret, as it would, of course, materially assist in the abolition of smoke. A trial is being made with a coalite plant at the Plymouth Gas Company's works, to demonstrate whether it can be usefully employed in conjunction with the manufacture of town's gas, and the result of the experiment is awaited with interest.

Well, Gentlemen, in this somewhat discursive address, I have only been able to touch lightly on some aspects of the gas industry; many of the points being capable of more extended treatment. The industry received a great impetus on the introduction of the incandescent mantle; but I believe it is on the eve of perhaps as great a change as has been experienced since its advent—viz., in the direction of economical manufacture.

I imagined I could hear some of you saying while listening to my remarks, that there was more of commercialism about them than engineering, and I do not for one moment take exception to that impression. In my opinion, the commercial side of an engineer's education is much neglected. It may not be necessary for a commercial man to be an engineer, but it is essential that an engineer should be imbued with commercial instincts if he is to be successful in his work, because after all, in a very large number of cases, it is necessary in carrying out engineering work to keep in view whether it is going to be a commercial success or not. In conclusion, I trust I have been able to arouse your interest in an important branch of the public service.

SOME ECONOMIC ASPECTS OF THE SLOT-METER SYSTEM.

A communication by Herr Kobbert, the Manager of the Königsberg gas undertaking, was published in a recent number of the "Journal für Gasbeleuchtung," in which he discusses a number of questions relating to the use of the prepayment gas-meter. Some of the points raised by him are novel and suggestive, and may prove of interest to English gas men.

Prepayment meters were first installed in Königsberg in 1898; but on April 1, 1899, only 105 burners were supplied through them. The following year, the number of burners had increased to 306, and the number of meters to 92. At that time differential prices for gas prevailed in Königsberg, according to whether the gas was used for lighting or for heating or industrial purposes. One lighting burner, however, was allowed on the supply at the lower rate in each room in which gas was used for cooking, heating, or technical purposes. The growth of the system of supply by prepayment meter, however, prompted the administration of the gas undertaking to revise these regulations, and abolish the minimum charge per annum which had hitherto been enforced on small consumers and to impose instead meter-rents. It was decided to allow two burners for illuminating purposes to be supplied with gas from the meter through which the supply for cooking, heating, or motor purposes was made. Consequently, consumers obtained gas for lighting so far as two burners were concerned at the lower rate of charge which was made for gas for heating purposes. The gas-rentals were collected from ordinary consumers at intervals of six weeks, or, if they desired it, more frequently. It was decided that the same rent should be charged for prepayment meters as for ordinary meters, that they should be emptied once a quarter, and that no deposit should be required from their users. It was decided also to allow with the larger sizes of prepayment meters a number of lighting burners proportional to the size of the meter in addition to the two burners already referred to. A supplemental charge of 3½d. a month was made in respect of these burners. These regulations had the effect of giving prepayment gas consumers the advantage of the lower scale of charge which was in force for gas for heating purposes, though a reasonable proportion of the gas passing through the meter might be used for lighting. Statistics are given as to the number of households in Königsberg and the number of rooms requiring to be heated in each, and also of the number of householders having incomes above and below certain stated limits. These statistics show that more than six-tenths of the householders have incomes exceeding £60 per annum, but less than half have incomes between £60 and £150 per annum. Nearly 39 per cent. of the householders have incomes below £60 per annum. These figures have been borne in mind in making the arrangements for the supply of gas to as large a number of consumers as possible.

Prepayment meters were first introduced rapidly into the dwellings of three and four rooms, with a view to utilizing quickly the manufacturing plant which had been installed at the new gas-works in anticipation of the future growth of gas consumption. The experience gained with the prepayment system in Königsberg leads broadly to the conclusion that the economical value of the prepayment meter lies chiefly in the method of payment, which allows the consumer to reckon up exactly his expenditure on gas. This is contrary to the English ideas in regard to the system. Since the year 1902, the gas consumers of Königsberg have been at liberty to have either prepayment or ordinary gas meters according to their choice. In both cases they buy gas at the same rate, and consequently obtain the same quantity of gas for the payment of the same coin. For instance, a 5-light meter for gas for lighting purposes only will be provided, if required, with a 50 pfennige (6d.) slot, or a 3 or 5 light meter for gas for cooking purposes will be provided with a 10 pf. (1½d.) coin-slot, while 10 or 20 light meters for supplies to bath rooms, &c., will be provided with one mark (1s.) coin-slots. This arrangement has proved very satisfactory; and it is generally recognized in Königsberg that gas is now the fuel of the people of small incomes.

The following table shows the rapid increase in the number of meters both ordinary and prepayment which has occurred since the introduction of the latter, and also the effect on the growth of gas consumption per head of the population.

Year ending April 1.	Gas for Lighting.		Gas for Cooking and Heating.		Cubic Feet of Gas Consumed per Head of the Population.
	Ordinary Meters.	Slot Meters.	Ordinary Meters.	Slot Meters.	
1903	5376	—	3916	486	1863·6
1904	5973	38	4312	1,950	2080·1
1905	6129	682	4215	4,180	2247·5
1906	6303	1172	4308	6,486	2385·6
1907	5240	1603	5789	8,998	2473·5
1908	5322	2163	6468	11,652	2717 9
1909	5971	2370	6619	14,178	2720·0

The rate of charge for gas for lighting purposes only is 16 pf. per cubic metre (4s. 6½d. per 1000 cubic feet); and for gas for cooking and heating, 12 pf. per cubic metre (3s. 5d. per 1000 cubic feet). It has already been mentioned, however, that a certain number of burners for lighting may be supplied at the lower rate where gas is consumed mainly for heating and cooking. Of the gas supplied to prepayment meters in 1908, 87·5 per cent. was sold at the lower rate. The average consumption per slot-meter was in 1900 only 9178·6 cubic feet; it reached a maximum in 1905 of 14,394·8 cubic feet; and in 1908 was 12,900·9 cubic feet. It may be asserted without fear of contradiction that but for the introduction of the prepayment meter, the greater part of the gas now consumed through these meters for heating and cooking would not have been sold at all.

The author next refers to the risk of loss to the gas undertakings through want of agreement between the records of the meter-index and the coins found in the box of the prepayment meters, and to various types of lock and coin containers intended to guard against the abstraction of money from the meters. Taking into account, however, the number of cases of loss incurred through theft or faults of the slot meters, and the magnitude of the staff required to supervise the prepayment meter system, and to collect the coin at regular intervals, he nevertheless comes to the conclusion that the system entails less trouble, a smaller staff, and less clerical work than does the dealing with the deposit system and the collection of arrears in the case of ordinary meter consumers. He next discusses the methods in which the coins may best be collected from the prepayment meters. He says that there are two methods in common use—viz.: (*a*) settlement of each prepayment meter account on the premises of the consumer; and (*b*) settlement at the gas-works. By the first method a collector goes from meter to meter, opens the coin-holder, and takes out its contents in the presence of the consumer. Any discrepancy between the coins in the holder and the record of the meter-index is thereupon settled with the consumer. The coin-holder is replaced and closed, and the collector goes on to the next meter. He reports the reading of the meter at the cashier's office on the gas-works, and pays in the money collected. This system, which is very general in the case of gas undertakings owned by private companies, entails supervision of the collector's work by inspectors, who must follow the collector from time to time on his round and note the readings of the meters. The method has the advantage of extreme simplicity. Nevertheless, it is possible in the course of time that large defalcations may occur under it; and for efficient inspection, one inspector is required for (say) every two collectors. The rent of gas-meters, boiling-rings, &c., is, as a rule, covered by an increase in the price charged for the gas. The method is eminently one in which the *personnel* of the collecting staff is of extreme importance, and it is necessary to decide to what extent chances must be taken or the cost of inspection be increased. It is less suitable for municipal undertakings where the administration of the cashier's department should embody the same safeguards as that of a national exchequer. Hence with municipal undertakings, the author prefers the second method of collecting and settling accounts which has been found, according to experience at Königsberg, to be no more costly than the first.

According to this method, a list of prepayment meters from which the coins are to be collected is handed at the office to a messenger from the cashier's department who at other times is employed in drawing up gas accounts. This messenger goes his round in company with a meter-inspector and a man who is in charge of an iron trolley mounted on pneumatic tyred wheels. This trolley has bars with spring lock fastenings (similar to the post office waggons which are in use in Germany), and is capable of containing about 200 coin-boxes. The requisite number of empty coin-boxes sealed at the office is placed in the trolley over night. In the morning, when the round is commenced, the necessary number of empty boxes is taken in a wire basket into each tenement house, and the messenger removes the full coin-box from each meter, replaces it by a sealed empty box, and notes the number of the box, while the meter-inspector reads the meter. The full coin-boxes are carried in the wire basket to the trolley, in which they are locked by the spring catches; and when the trolley is full, it is taken back by the man in charge to the cashier's department. As soon as the trolley is filled, the messenger from the cashier's office is free to attend to other work. The boxes are then opened at the cashier's office, and their contents counted and compared with the meter readings. Any discrepancies have, of course, to be settled afterwards with the consumer. According to the author, this method of collection costs only about half as much as the first. Each messenger is sent in turn to every district of the town, so that at Königsberg the same messenger does not go back to a particular district more than twice a year.

It is claimed by Herr Kobbert also that the economy of collection and of keeping the accounts, coupled with the freedom from arrears, makes almost any prepayment gas-meter system more economical for a gas-works than the system of ordinary meters, notwithstanding increased cost of the prepayment meter. He does not consider it necessary to success to combine the prepayment meter supply with the hiring-out of gas appliances, such as burners, boiling rings, &c. He considers that the chief advantage of prepayment meters lies in the method of payment and collection. In these conditions, the prepayment system has extended in Königsberg relatively to the ordinary meter system to the extent shown by the following details for the numbers of meters in use at the end of the year 1908: On gas for lighting at 4s. 6½d. per 1000 cubic feet, 5971 ordinary meters, 2370 prepayment meters;

and on gas for cooking and heating at 3s. 5d. per 1000 cubic feet, 6654 ordinary meters, and 14,178 prepayment meters.

[In regard to Herr Kobbert's arguments as to the best method of collecting the contents of the coin-boxes of prepayment meters, it should be borne in mind that the 10-pfennige coin (which is the working equivalent in Germany of the English penny) is of nickel and weighs only about half an English bronze penny. Hence the weight of the coins to be collected and conveyed to the cashier's office is much less in Germany than in Great Britain relatively to the amount of gas consumed through the meters.—Ed. J.G.L.]

A BOOSTER SYSTEM AT ROCHESTER (N.Y.).

In one of the papers prepared for the annual meeting of the American Gas Institute, Mr. Frank H. Hellen, of Philadelphia, gave the following particulars of a booster system installed at Rochester (N.Y.).

About a year ago, the pressure conditions in the south-western section of the city of Rochester were such as to call for immediate attention; 14-10ths being the maximum in one part of the town. A 10-inch line running south showed a drop of 25-10ths in a distance of 3600 feet. Pressure readings taken on a 16-inch line at one point showed 4 inches; the drop in pressure from the works to this spot being exceedingly low, due to the fact that the feeders, consisting of one 16-inch and two 12-inch mains, were of ample capacity. There were two remedies to choose from—one being the extension of the 16-inch pumping line and the provision at the gas-works of an exhauster which would pump the gas at a high pressure, involving an outlay of approximately $30,000; the other, the installation of a fan system, at an estimated cost of $3000. As the congestion in the area to be dealt with was the result of changes occurring over rather a long period, and as there was nothing to indicate an early recurrence of these conditions, it was thought that the $27,000 difference between the two figures could be put to better use than by sinking it in an exhauster scheme. The less expensive remedy was therefore chosen, in the belief that satisfactory results would follow its use; and in this the parties concerned were not disappointed.

A blower-house, 13 ft. by 22 ft., was erected; and in it were installed a 40 H.P. electric motor and a No. 10 Sturtevant fan, the inlet of which was connected with the 16-inch gas-main, while the outlet ended in the 10-inch main. It was arranged to pump from the larger main into the smaller one, and thence through other 10-inch mains to an 8-inch main. All the small mains on the route of the new pumping lines were disconnected, and the services on the 10-inch mains provided with house governors. Between Nov. 10, 1908, and March 1, 1909, the average duration of the pumping was three hours nightly; and the pressure carried on the outlet of the fan ranged from 10 inches up to 20 inches. The maximum pressure obtained at one point during pumping hours was 8 inches; while throughout the area in which the troubles from low pressure formerly existed, there was no difficulty in maintaining a uniform pressure of 3 inches. The maximum hourly discharge in this territory was 70,000 cubic feet.

The total cost of the installation—including fan, motor, house governors, street connections, and building—was $3200; and by it a saving of $2140 was effected in the first year, taking $30,000 as the estimated cost of the alternative scheme.

Mr. Hellen stated that in Rochester they had been particularly pleased to think they did not continue the 16-inch high-pressure main into the booster district, for since considering as to doing so they thought they would probably need a 3 million cubic feet gas-holder; and if they built one, it looked as though it would be an outlying holder. In this event, the present 16-inch high-pressure mains would be ample for ten years to come; and the money that would have been invested in the main will be spent in putting up a storage holder.

Summing up the advantages of the booster system, Mr. Hellen said that in the first place they had saved money on the installation; secondly, they were not working at excessively high pressure, which meant a decrease in leakage and a maximum of safety; next, they had the advantage of making an installation that required only a moderate investment; and, finally, the large gas-mains which were laid to the heart of the city in order to ensure an adequate supply at the time when gas was used almost exclusively at that point, and which had long since outlived the conditions which compelled their installation, were utilized, and were therefore again a necessary part of the system—their value being nearly, if not quite, as great as it was when they were originally laid.

Royal Society of Arts.—Sir William H. White, the Chairman of the Council, will open the new session of the Royal Society of Arts to-morrow with an address, the subject of which will be "An Imperial Navy." Before Christmas, there will be four ordinary meetings of the Society; but the papers to be read are not upon subjects connected with the interests with which the "Journal" is identified. After Christmas, however, Mr. Kenneth Gray will submit one on "Heating and Ventilation." On Jan. 5 and 12, 1910, Professor Harold B. Dixon, F.R.S., will deliver two lectures to juveniles on "The Chemistry of Flame."

DETERMINING THE VOLATILE MATTER IN COAL.

Dr. H. Beck, the Chemist to the Concordia Mining Company, of Oberhausen, described, in a recent number of the "Journal für Gasbeleuchtung," a new method for the determination of the volatile matter in coal, which he contends gives more consistent results than the methods hitherto adopted.

He refers first to the proposal made by Professor E. J. Constam, of Zurich, in his paper before the International Congress of Applied Chemistry in May last [see "Journal," Vol. CVI., p. 584], that the method of determination suggested by the Committee on Coal Analysis of the American Chemical Society should be recognized internationally as the standard method. The results obtained by the method are generally concordant within 1 per cent. for the same sample of coal. A difference of 2 per cent. is very rare. Other methods of determination differ considerably in their results, owing to the coal being more or less completely carbonized. The coke remaining in the crucible retains more or less the character of the coal according to the temperature and the duration of the heating to which it has been exposed. Thus the results obtained by Muck's and the Bochum methods are from 2 to 4 per cent. higher when a porcelain crucible is used than with a platinum crucible; and considerable differences result even with platinum crucibles, according to their dimensions or condition. The yield of coke is dependent to a nicety on the temperature and rate of carbonization; and these two factors are determined by the material and size of the crucible, the method by which it is heated, the quality of the fuel, and the quantity of coal taken for the test.

The low results obtained by the method of Hinrichsen and Taczak, according to which 4 to 5 grammes of finely-powdered coal is heated in a capacious Rose crucible in a stream of hydrogen—gradually at first, and subsequently with the full flame of a powerful burner—are explained by the gradual carbonization of the coal, consequent on the temperature being raised slowly, resulting in the yield of gas being low. The passage of a current of hydrogen through the crucible has no effect on the ultimate result, as coal can be carbonized in a crucible without any combustion taking place without the use of hydrogen. It appears necessary, therefore, that, in order to obtain comparable and unexceptionable figures for the yield of gas in a crucible, the method of carbonization in the crucible should be made completely independent of the material and size of the crucible, the mode of heating, the quality of the fuel, and the quantity of coal taken. The author has devised a method which he claims is wholly independent of the factors enumerated, and secures uniform carbonization throughout the test.

According to this method, from 1 to 5 grammes of the finely powdered coal is taken in a platinum or porcelain crucible provided with a well-fitting perforated lid. It is heated for a few seconds with the full flame of the bunsen burner, in order to start the evolution of gas. As soon as the products of gasification ignite, the rate of gasification is checked by diminishing the bunsen flame to such an extent that the combustible products escaping at the hole in the lid can be ignited by a small flame, while they will not continue to burn when the small flame is taken away. The bunsen flame is regulated throughout to preserve this condition of regular evolution of gas, so that the carbonization of the sample of coal proceeds at a uniform rate. When the volatile constituents have been so far driven off that they no longer ignite at the hole in the crucible lid, the heating is continued for one minute longer with the full flame of the bunsen. The gas thus driven off burns, in consequence of the high proportion of hydrogen in it, with a non-luminous yellowish flame. The end of this last period of carbonization is indicated by the yellow flame dying out. A coating which sometimes forms on the upper side of the lid of the crucible must be burnt away; but on the inside of the lid and on the sides of the crucible there should remain a deposit of carbon.

The figures obtained for the volatile matter in coal by this method agree very closely with one another for the same sample of coal; but they are from about 2 to 4 per cent. higher than the results obtained by Muck's method. They are completely concordant whether a platinum or a porcelain crucible has been used, and are independent of the quantity of coal taken. A number of results are given in tables for the same samples of coal carbonized according to this new method, taking (1) 1 gramme of coal in a platinum crucible and heating for 5 to 7 minutes, (2) 1 gramme of coal in a porcelain crucible and heating for 5 to 7 minutes, and (3) 5 grammes of coal in a platinum crucible and heating for 25 to 30 minutes. The results show very close agreement, though, on the average, the figures obtained with the porcelain crucible are nearly 0·1 per cent. lower than the others. This method of determination does not require the observance of particular conditions of heating, such as the size of the bunsen flame, the distance of the mouth of the burner from the bottom of the crucible, or a particular quality of fuel. The intensity of heating, and consequently the rate of carbonization, are controlled in each test by continuous observation of the inflammability of the escaping products, and are independent of multitudinous other factors that have to be precisely observed with the methods hitherto used.

The author next compares results obtained by duplicate tests of the same samples of coal according to the new method and according to Muck's and the Bochum methods. The results in

all three cases agree with one another within about 0·1 per cent.; so that, in this respect, the new method presents no practical advantage over the other two methods. But when 1 gramme of coal is taken, the time of carbonization is about three times as long with the new process as with the others; and this gradual carbonization causes the cake of coke obtained to differ considerably in appearance from the residual coke produced by the rapid decomposition of the coal substance by Muck's or the Bochum methods. The latter methods yield a dense, grey, and shining cake of coke; whereas the coke from the new process has the grey, shining, dense characteristics only in its lower half—the upper part being black, friable, and powdery.

The results of crucible tests made according to the author's new method were next compared with the results of the carbonization of the coal in coke-ovens. The charge of coal for the oven was very carefully sampled, and the amount of water and ash contained in it was determined; while the yield of coke was estimated in the crucible according to the new method, Muck's method, and the Bochum method. The coke drawn from the oven was also carefully sampled and the moisture in it determined. Owing to the large mass of coke removed from an oven and some slight differences in the uniformity of quenching, it is almost impossible to say that the moisture determinations, however carefully the sample has been taken, are truly representative of the average amount of moisture found in the mass of coal. Of nine different coals thus examined, the yield of coke obtained in the ovens on the working scale is, for the first sample, 2 to 3 per cent. below the results of the crucible methods; for the second, third, fourth, and fifth samples, it is in fairly close agreement with the yields obtained by the Bochum method, and is considerably below those obtained by the new method; while for the sixth, seventh, eighth, and ninth samples, it agrees satisfactorily with the results in the crucible by the new method, and is considerably above the results by Muck's and the Bochum methods. The figures obtained by Muck's method are in fair agreement with the practical results for the fourth and fifth samples, but not for the others.

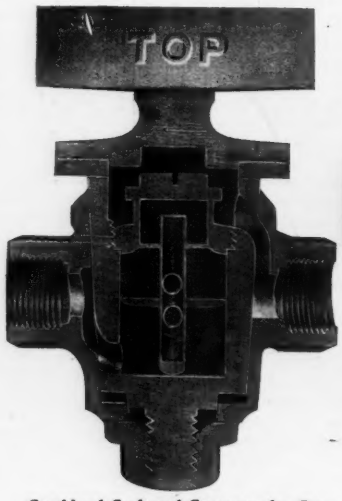
It would appear that none of the three crucible methods used gives satisfactory figures to serve as an indication of the yield of coke which should be obtained from coal on a large scale. They demonstrate once again that it is impossible to draw conclusions from the results of small laboratory tests as to the results of carbonization in ovens. The conditions of working on a large scale can never be reproduced with a small quantity of coal in a small crucible in a manner to admit of practical comparison of the yields. The crucible results can at best only approximate to the yields of coke obtainable on a large scale. The value of the crucible tests appears rather to consist in the exact determination of the degree of volatility of the coal; and this determination is best made by the slow uniform coking of the coal in the crucible as carried out by the method proposed by the author. According to this, the volatility of the coal is the quantity of volatile matter yielded per 100 parts of the pure coal—*i.e.*, the coal less the moisture and ash contained in it—by gradual and uniform carbonization in a platinum or porcelain crucible in the manner described. The results thus obtained, according to the author, make it possible to class the different coals according to the ease with which they decompose chemically. The volatility factor represents a constant for each description of coal which is useful in assessing the technical value of the coal.

A COMBINED STOPCOCK AND GOVERNOR.

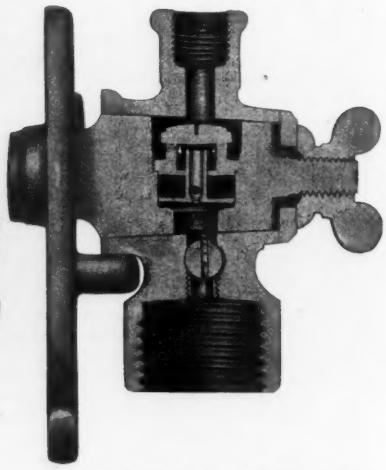
The Sutherland Meter Company, Limited, of Witton, Birmingham, have now got their new workshops into working order; the several departments having been organized on a fresh basis, and brought up to the highest efficiency, as regards workmanship, dispatch, and the introduction of up-to-date machinery.

The firm have also added a fresh department to their business, and are now manufacturing the Purves patent stopcock and governor, which is a neat combination of stopcock and governor [see "JOURNAL" for Aug. 31 last, p. 582], and has met with much success with users, as it is designed for incandescent lighting, gas-fires, &c. The governor is constructed so that it may not be tampered with; and the value of this arrangement will be at once seen, as after the governor is set to its required quantity, no unauthorized person can alter it (the regulating mechanism being inside), and the requisite amount is delivered no matter what pressure is put on. This is claimed to ensure a saving of 25 to 30 per cent., combined with proper combustion of the gas used. The fitting up to the stove in this way entails less expense, as fewer joints have to be made. The cleaning can be done without turning off the gas at the main, but simply by shutting off the stopcock.

In addition to the above, mercurial and diaphragm governors are now being manufactured by the firm; and the new management are entering this field with a determination to turn out only first-class work. Arrangements are also in progress for the construction of retort governors, district governors, and station governors; and as the works are well constructed and roomy, there is every facility for a further increase of business. It may be mentioned, too, that the company are now manufacturing the Hansford patent automatic recording meter, which makes out its own bill by suitable mechanism; and no reading of the index is required. Other novelties are also in course of preparation.



Combined Cock and Governor for Gas-Fires, Stoves, Radiators, &c.



Combined Lamp-Cock and Governor for Street-Lamps.

Fire-Clay Deposits in India.

We have received from Mr. Murray Stuart, B.Sc., F.G.S., the Assistant-Superintendent of the Geological Survey of India, Part II. of Vol. XXXVIII. of the "Records of the Geological Survey of India," which contains an article by him on "China-Clay and Fire-Clay Deposits in the Rajmahal Hills." It appears that fire-clay occurs somewhat plentifully on the western side of the hills. In order to test these clays, Mr. Stuart made some small bricks and subjected them when dry to a white heat (about 1600° Fahr.) for fifteen minutes in a blowpipe furnace. In this way, he was able to test both their plasticity and refractoriness. The results of his experiments led him to the conclusion that they would answer most, if not all, of the requirements for which Stourbridge clay is at present used. He gives tables indicating the localities where the clays are to be found, and says these are in many cases perfectly infusible, and of a texture quite as fine and uniform as that of the finest Stourbridge clay. He therefore sees no reason why they should not be employed in the manufacture of such articles as gas-retorts, as well as the simpler kinds of fire-bricks. In addition to the high-quality clays, there are many which are equally infusible, but which have not a sufficiently fine texture to be suitable for retorts; but Mr. Stuart says they would make fire-bricks which should be quite as satisfactory as those made from the finest fire-clays.

An Aluminium Gas-Stove.

A portable gas-heating stove of which every part except the burners is of aluminium is being made by the Elbard Stove Company; and though it is non-condensing and flueless, the claim is advanced for it that it is absolutely safe and pure. The stove, which is circular, is 20 inches high, and has a diameter of 12 inches at the base. The heating is accomplished by two flat-flame burners; and the stove acts on the regenerative principle. After being utilized to heat the dome-shaped top of the stove, the hot air passes out into the room. In the list before us, it is stated that the cost is only 1½d. for ten hours' heating; but no indication is given of the price of gas on which this calculation is based. The advantages put forward for aluminium in this connection are its extreme lightness and the fact that it does not rust. The stove is shown fitted with a flexible tube, in order that it may be moved about for use in different places as required.

We have received from Messrs. Emmott and Co., Limited, of Manchester, the "Mechanical World" Electrical Pocket-Book for 1910. The contents, which consist of a number of electrical engineering notes, rules, tables, and data, have undergone considerable revision; and in some instances the sections have been rearranged to give them a more orderly sequence.

A RECORD FROM SCOTLAND

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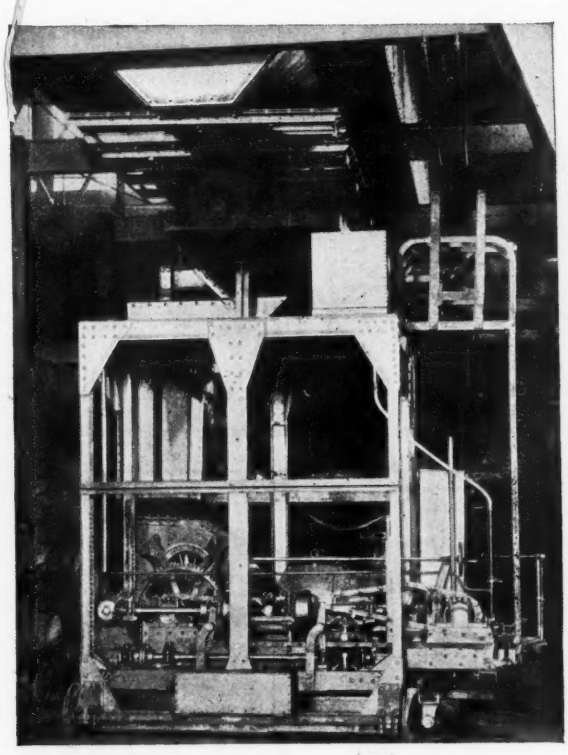

STIRLING RETORT-HOUSE.

See "JOURNAL," Aug. 3, 1909, Page 309.

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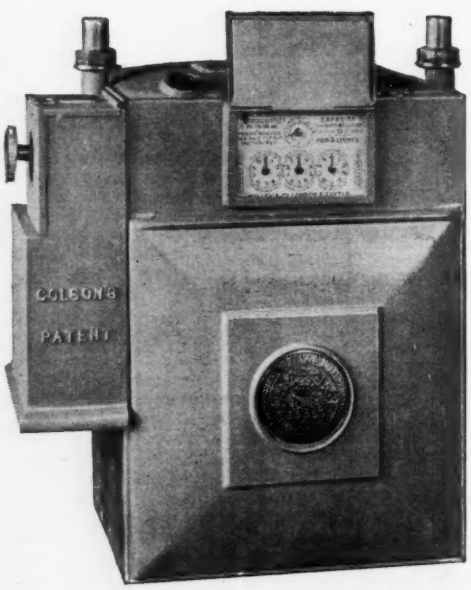

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LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Visit to Vauxhall.

On Saturday afternoon, the Association paid a visit to the Vauxhall works of the South Metropolitan Gas Company. The members, with the President (Mr. W. J. Liberty), were met at the entrance to the works by Mr. A. F. Browne, the Engineer, and his Assistants—Messrs. W. G. Head, J. Dickenson Gair, J. Pendeberry, G. Frost, J. Kneeshaw, M. Tysoe, and H. Sims—and Mr. Layton, from the Old Kent Road works. The party was divided up into four sections—Mr. Browne leading the first.

The works were not new to the members of the Association; for it may be remembered that the programme three years ago included a visit to Vauxhall, and this duly took place in March, 1906. However, the station is one that will well bear a second, or even a third, inspection; and the members greatly appreciated the opportunity thus kindly afforded by Mr. Browne of renewing their acquaintance with the varied plant that is under his charge. It was natural that a good deal of interest should be displayed in the altered method of carbonization which Mr. Charles Carpenter, the Chairman, announced in a letter to the "JOURNAL" some months ago had been in operation at the Company's works since the early part of the present year. This method consists of heavy charges, of twelve hours' duration; and the results are found to be eminently satisfactory. In addition to the other advantages of the system, there have since its introduction at Vauxhall been practically no stopped pipes; and trouble with pitched mains has been unknown. Of the four retort-houses (containing a total of 866 20-feet retorts, the maximum output being about 13 million cubic feet per day), there are three in which mechanical stoking is employed—by West's compressed air and the Arrol-Foulis hydraulic machinery—and one in which the retorts are charged and drawn by hand. The latter is being used less and less each season; and owing to the new method of heavier charges, the Arrol-Foulis system of charging is being extended, along with the Hunter-Barnett coke pusher.

The coal storage is 15,000 tons; the coal being brought by lighters, and unloaded by hydraulic cranes, one of which has a Hone grab carrying 15 cwt. per lift. In winter, a good deal of coal is stored in the open; and, of course, great care is exercised to prevent over-heating. As soon as the rods inserted for the purpose (which are examined every day) get too hot, the coal affected is at once removed to the retorts or else a drastic water cure is applied. If the latter plan is decided upon, 2-inch pipes spiked at one end, and drilled with ½-inch holes round them, at distances of about 6 inches apart, are inserted at intervals in the coal heap—the spiked end being driven almost to the ground level. The free ends of the pipes are attached to hose, through which the deluge of water that is required to put out coal fires of this character can easily be poured.

Unfortunately, there is at this station no room for outside producers; and the generator gas-furnaces are placed below the retorts and fed direct with hot coke. Two producers supply four beds, or 40 retorts, with gaseous fuel of the following composition: Carbonic oxide, 29 per cent.; hydrogen, 6 per cent.; carbonic acid, 4 per cent.; nitrogen, 61 per cent. The depth of coke in each furnace is about 4 feet, and the grate area 28 square feet, or 0·7 square foot per mouthpiece. The hydraulic mains are of the shallow type; and the drain valves are designed to maintain a liquor seal. Relief mains (18-inch) are provided on the top of the retort-settings; and within the hydraulic and relief mains an exhaust of about ¾ inch water column is maintained, controlled by 8-inch retort-house governors. The whole system of tar and liquor service pipes about the works, and all the storage tanks, have been undergoing reconstruction during the last eighteen months; and this work is now practically completed. All the pipes are turned and bored; and each joint is held by an iron clip to prevent expansion. The object, of course, has been to get every pipe carrying tar and liquor absolutely "bottle tight"—and the same with the tanks, except for the necessary ventilation. To prevent the loss of ammonia which would ensue from this ventilation if it were open direct to the atmosphere, there has been provided in connection with the vent-pipe a small coke-scrubber, which is kept supplied with water. This arrests any ammonia in the fumes.

The condensers are of the hydraulic tower type, designed by Mr. Charles Carpenter. They are 10 feet in diameter and about 40 feet high. In each there are 120 3-inch tubes, through which the gas passes. At the top is a distributing arrangement for the tar, designed to supply each 3-inch tube with an equal quantity. The spaces outside the tubes are filled with water, which, after having done duty, passes to the top of cooling towers, and is subsequently circulated afresh. With the tar, too, a constant circulation is kept up; the same tar passing several times through the condensers. The three cooling towers, to the top of which the water is led from the condensers, are filled with expanded metal. The water stream is thus broken up, and meets with a blast of air as it travels down. By this means, the water is cooled again to atmospheric temperature, or very little above it. Every gallon of tar leaving the retort-house does duty in these condensers, for the purpose of washing the gas for the extraction of naphthalene. The result is that the amount of naphthalene which has to be removed either on the works or in the mains at the Kennington distributing and storage station has been reduced to a negligible quantity. To finish the operation, there is another solvent used, besides the tar.

From the condensers, the gas passes through three Livesey washers; and then through three tower scrubbers, filled with thin boards on edge, and through which large quantities of gas liquor are passed. The final traces of ammonia are removed in Kirkham, Hulett, and Chandler rotary washer-scrubbers. Oxide of iron is, of course, used for purification, with Weldon Mud in the last two vessels, as a final catch. On leaving the purifiers, the gas passes through three naphthalene washers (of the same construction as the Livesey washers), charged with a solvent oil.

A point that strikes one on the works is the considerable number of rope drives; and inquiry elicits the fact that in many positions these are found much more convenient than straps. The exhauster-house is a really notable example of the fitting-in of machinery; and to find space there for another piece of apparatus, however small, would certainly be an impossibility. There are six exhausters, driven by Donkin's Farey condensing engines. Four are of 200,000 cubic feet per hour capacity each, and two of 100,000 feet. Still further provision is being made for the comfort of the men, by the erection of new stokers' lobbies, lavatories, &c., in a central position, instead of having them scattered over the works as hitherto.

The gas manufactured at Vauxhall is transmitted to the Kennington storage station, one-third of a mile away, where there is gasholder capacity of 10½ million cubic feet. In the winter two Sturtevant fans driven by steam-engines draw the gas from the works, thus reducing the pressure upon the purifiers; and for the purpose of raising the pressure of the gas at the inlet of the district governors to a pressure higher and more constant than can be obtained from the gasholders, four similar fans are employed. Two of these are of a capacity of 600,000 cubic feet per hour, each driven by a 37 I.H.P. Crossley gas-engine; one of 450,000 feet capacity, driven by steam; and one of 250,000 feet capacity, driven by an 18 I.H.P. gas-engine.

At Kennington as elsewhere, the exactions of the Metropolitan Water Board have led to the sinking of an artesian well to a depth of 400 feet in the chalk. As the result of this enterprise, the Company have secured an ample supply of good potable water. It is a little harder—perhaps 4°—than the Board's supply; but the necessary softening is easily carried out. There is also at Kennington a steam fire-pump connected with hydrants all over the station. This derives its water supply from the gasholder tanks; and the pump is capable of throwing a 1-inch jet to any height that is likely to be required.

After the members had inspected the works, they were accompanied by Mr. Browne on tramcars to Kennington, to go over the storage station; and then returned to Vauxhall, and were entertained at tea in the works. After tea,

Mr. J. R. GALE (Mill Hill) proposed a vote of thanks to Mr. Browne and his Assistants for their kindness in having them at their works that afternoon, and referred to the order and method observed at Kennington, and the strict discipline carried out. In fact, everything seemed up to "concert pitch." They had the example of the two systems of stoking before them—viz., hand charging and machine charging. He presumed it was inevitable that mechanical stokers should be introduced to the displacement of labour.

Mr. ERNEST SCEARS (Hampton Wick) supported the resolution, and said the Association had been honoured by Mr. Browne's presence, not only on this, but on other occasions.

Mr. T. F. CANNING (Ilford) also supported the resolution.

Mr. S. A. CARPENTER (Mill Hill), in supporting, spoke of the lessons that were to be learned at the works by the attention to details which they had all observed.

Mr. J. G. CLARK (London) added his testimony to that of the previous speakers, and said they were reminded that afternoon of what Mr. Corbet Woodall had said at the opening meeting of the session—that new problems were often old problems in new disguise. He advised members to always make a note of what they saw.

Mr. L. F. TOOTH said Mr. Browne and his Assistants that afternoon had shown them some very practical work.

The PRESIDENT, in putting the resolution, said many were for the first time making the acquaintance of Mr. Browne and Vauxhall; for the status, if he might use the word, of the Southern Junior Association had somewhat altered since the last visit. Previously the membership was largely confined to the London area, and chiefly connected with the distribution side of the industry. Now the members were drawn from the works of Companies outside the Metropolitan radius. It might be interesting to know that there were eighteen new members from gas-works chiefly outside London, waiting to be received in that afternoon. Mr. Browne had taken more than a passing interest in the Association, and was no stranger to the Cripplegate Institute. It was with regret that they learned of the breaking of the official link between Mr. Browne and the Southern Seniors, by his resignation of the position of Hon. Secretary. It was to the Southern Seniors that they as Juniors were keenly looking for advice and sympathy. The latter he believed they had, as evidenced by the fact of such gentlemen as Mr. Corbet Woodall, Mr. H. E. Jones, Mr. J. W. Helps, and Mr. A. F. Browne giving up their time and coming among them and offering them words of wisdom and counsel. If the Southern Seniors were the parent Association, then the Junior Association were their children; and as the child looked to its

parent for support and help, so the Juniors looked to the Senior Association for help and some closer connection. What this closer connection could be, it was not for him to speak of then. Certainly, these Saturday afternoon visits to works, with Seniors taking them round, were one way. He thanked Mr. Browne and his Assistants for what they had done, and for the hospitality extended to them.

The resolution having been carried with acclamation,

Mr. Browne thanked the members for the kindly way in which the vote had been expressed. With regard to Mr. Gale's remarks as to mechanical stokers, it was by stoking machinery and by mechanical charging that the best results could be obtained. He felt that he was addressing a party who were quite at home in a gas-works. They had various people who visited their works. Young gentlemen who took up the science side of college education, and even parties of young ladies who had a thirst for knowledge, visited them. He gave five distinct reasons why the full retort was advantageous over the six-hour charge: (1) A greater make of gas per ton of coal; (2) better coke; (3) absence of stopped pipes; (4) better tar, it being free from water; and (5) no pitch in the hydraulic main. It had been a great pleasure to meet them that day; and he trusted that in the future they would come again.

MIDLAND JUNIOR ASSOCIATION.

Visit to the Foleshill Gas-Works of the Coventry Corporation.

On Saturday afternoon, the members of the Midland Junior Gas Engineering Association, to the number of about fifty, paid their second visit to Coventry. Since their first visit, three years (almost to a day) had elapsed; and the intervening period has been an eventful one at Foleshill—which, of course, on both occasions was their objective. In 1906, it was mainly a question of learning what was going to be done on the extensive site, 3 miles from the centre of the city, which had been prepared for the erection of new gas-works for the Corporation; though the water-gas plant, two holders, and the chemical works were even then completed. They went on Saturday to inspect a complete works, from which the whole of the gas consumed in Coventry has now for some months been supplied. On arrival at the station, a tramcar was in readiness to take the party out to Foleshill, where they were met by Messrs. P. N. and C. G. Langford and J. H. Hardy, Assistants to the Engineer and Manager (Mr. Fletcher W. Stevenson). Dividing into three groups, headed by one of these gentlemen, the inspection was at once commenced—the guides explaining everything in the fullest possible manner. Of the works themselves—which were erected to the designs, and under the superintendence, of Mr. Stevenson—it is unnecessary here to speak in detail, seeing that they were fully described and illustrated in the "Journal" at the time of the formal inauguration last June (p. 716).

Much praise was bestowed upon the works generally; and the openness of the site and roominess of the buildings were greatly appreciated. Remark, too, was made as to the harmony of design throughout the works. The last building contract, which is now practically completed, is for the offices and laboratory. In the retort-house (which has a capacity of some 4 million cubic feet per day), the members were able to make close acquaintance with the Fiddes-Aldridge stoking machine for discharging and charging at one operation. The working of the apparatus was closely watched; and note was taken of the evenness of the 7 cwt. coal charges. A good deal of time, also, was spent over the coal-handling plant, which is of a most complete character, from the hydraulic capstans for drawing the waggons to the hydraulic tippers, to the coal-stores and the retort-house overhead hoppers. Then the coke hauling and screening plants were inspected; and in connection with them it was pointed out that the system in use for removing the coke from the retorts and quenching it in cages underneath, which afterwards discharge into side-tipping waggons, works very satisfactorily indeed, and leaves the coke in excellent condition. The carburetted water-gas plant, consisting of two sets capable of producing 1¼ million cubic feet a day, was not in operation; but a visit was paid to the building, and the spaciousness of the stage-floor was seen. In connection with the chemical works, it was pointed out that the plant which was originally used for the manufacture of sulphate of ammonia had, by means of slight alterations, been converted, with highly profitable results, to a concentrated liquor plant. If at any time found desirable, the re-conversion of the apparatus so as to turn out sulphate of ammonia will be quite a simple matter. A small, but useful, feature which was noticed was that drawings of the different parts of the works, framed and glazed, were hanging on the walls in the different departments to which they referred.

Provision for the comfort and welfare of the men employed was everywhere noticeable, but nowhere more so than in connection with the canteen, in which, at the conclusion of the inspection, the members sat down to tea, at which pleasant function they were joined by Mr. Stevenson. The canteen is a large well lighted room, with seven tables on each side, arranged for the seating of ten men. There is thus accommodation for 140 men at one time. Each seat is numbered by means of a brass tablet; and corresponding with these numbers there are tin pans and cans. Meals are all supplied at fixed charges; or the men can have their own food cooked or warmed for them. The canteen is merely made self-supporting; and all the men are asked to pay for the use of it is 1d. per week. After tea,

The President (Mr. A. O. Jones, of West Bromwich) remarked that they were now about to separate after their pleasant visit; but before doing so, he would like to offer a word of thanks to Mr. Stevenson and his Assistants for the kindness that had been shown them while at the works, and to the Corporation Gas Committee for allowing them to make their inspection. They had been over that day a works complete which three years ago they had seen in partial existence. They were now a very fine works—beautiful, without being over-embellished. Everything appeared to have been laid out on a most ample scale—with splendid provision for extensions in the future; and so far as juniors could judge of the work of their superiors, the planning-out seemed to be first rate. Everything was ordered for doing the work on the most economical lines. He was sure they had all enjoyed the visit; and he had much pleasure in proposing a hearty vote of thanks to those who had given them such a treat.

The Senior Vice-President (Mr. R. S. Ramsden, of Burton-on-Trent), who seconded the vote, said they all felt that they had learnt a lot that afternoon. The workmen in the employ of the Coventry gas undertaking were to be congratulated upon having such a fine messroom for their meals, and upon the attention that was paid to their comforts generally.

The proposition having been carried by acclamation,

Mr. Stevenson, in acknowledgment, said thanks were chiefly due to his Assistants, who had gone round the works with the members that afternoon. He had felt that, as they were members of the Association, it would be much nicer, and perhaps more convenient, if they met the party and acted as guides, and then he himself afterwards joined them at tea. It was a great pleasure to all the members of the staff who had had anything to do with this matter to see visitors at the works. It was regarded as a compliment that members of Associations like theirs should wish to see what was being done at Coventry. At Foleshill, they were not, of course, up-to-date now; they were old-fashioned. (Laughter.) It was necessary to go to St. Helens to see the very latest thing. Perhaps next time the members came, and there was anything fresh to show them, it might be really up-to-date. But they could not all have the very latest things; and when his hearers got into positions of greater responsibility, they would realize (if they did not do so now) that it might be better to try and obtain the finest results possible from what they already had than to make changes simply for the purpose of having the newest forms of plant. They must first figure the matter out, and see whether they were going to save by the change. They must be quite confident that they were going to realize all that people told them they would. It was not always the most modern and up-to-date works that were the most successful. He well remembered many years ago when the members of the Gas Institute went to Sheffield (it was before he himself became connected with the Company) the price of gas there was at that time comparatively low—one of the lowest in the kingdom—and there was then absolutely nothing modern on the works. When regenerative firing was coming in, they did not touch it—all open fires were used. The standard, with the 15-hole burner, was 16 candles, which was a high one. After the visit to the works, the late Sir (or Mr., as he then was) George Livesey remarked that what they had seen only showed them that they did not need modern plant to sell gas cheaply. Something else was wanted; and if a gas undertaking was not worked well, it would not matter what the plant was. He was much indebted to his Assistants for the good working at Coventry. The designing of the place was his in the first place; but those who were on the works now were just as responsible as he was for the results that were being obtained. For whatever might be achieved at Foleshill in the way of working, the credit would be due to his Assistants just as much as to himself.

The party then left the works as they had come, by special tramcar; and all were agreed that a most instructive and enjoyable afternoon had been spent.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Visit to the Dunfermline Gas-Works.

A Quarterly Meeting of the Eastern District Division of this Association was held in Dunfermline last Saturday; and it was attended by about forty members. They first paid a visit to the Corporation gas-works, where they were received and shown round by Mr. A. Waddell, the Engineer.

The party were greatly interested in Mr. Waddell's novel method of conveying material, which, as already described, consists of an elaborate series of narrow-gauge railways on each "floor" of the works, and also underground, on which run small trucks, made to tilt to either side, and a hoist or lift which serves all the floors. The conveyors receive the coal from the breaker, carry it either to any part of the store or direct to the hoppers on the retort-bench; and they receive the coke from the quencher, which is a box immediately underneath the charging-stage, into which the coke falls on being drawn, and carries it either to the screening-machine or for storage in the yard. By means of the

railway in a tunnel, the branches of which extend in all directions below the coal-store and the coke-yard, coal or coke can be taken from any part of the works and conveyed to any other part where it may be required. At present a large coke-receiver is being constructed, of concrete, over a siding of the North British Railway, to be used for the storage of screened coke. Its capacity is 250 tons. The lift which serves the existing screening-plant will be carried 20 feet higher; and from the trucks the coke will be emptied into the hopper of the screening-machine, which is a revolving drum. The breeze will fall into a hopper outside the receiver, and be dealt with as required in the works. The drum will then carry the screened coke forward over the receiver, until it reaches the centre, where an ingenious arrangement, somewhat of the pattern of a ladder with broad sloping steps, situated in a shaft running to the bottom of the receiver, will take it, and deliver it on whichever side of the shaft is desired. This arrangement is made with a view to giving the coke only a short fall at a time, and so preventing it being unnecessarily broken. It will fall from step to step, and "bing" itself by the operation of the law of gravitation. The new receiver is being erected chiefly for the service of shipping orders, which are generally required to be executed with great despatch. By its use, if the Railway Company provide waggons, it will be possible to load the entire contents of the receiver (250 tons) in three hours; thereby doing away with demurrage charges. The cost of the new plant is a little over £400. The existing screening plant is to be retained, to deal with small orders. The ingenuity of the new structure consists in the novel arrangement for causing the coke to trickle down gently, and in the construction and arrangement of the delivery ports in the bottom of the receiver.

Among other new provisions in the works is a sulphate-house and workmen's room, which have been erected in the centre of the yard; the situation of the former sulphate-house, beside the engine-house, having been found to be objectionable. The plant installed is Wilton's patent, and it is capable of dealing with 2 tons of sulphate per day. The workmen's room is a very comfortable apartment, well furnished and warmed, and provided with lavatory and bath accommodation. The arrangements for compressing the gas which is sent to Charlestown, and which have been already described, were shown and explained.

THE BUSINESS MEETING.

The Business Meeting was held in the Masonic Hall, in New Row.

The PRESIDENT (Mr. H. Rule, of Falkirk) said he was pleased at seeing so large a gathering of members. He hoped those who had had the pleasure, which he unfortunately had not, of visiting the gas-works had found something of interest for them there. They were to be favoured with a paper by Mr. Chalmers, of Alva. Mr. Chalmers was a new member, and he (the President) was sure they were all very pleased that he had so early come forward to give them a paper.

Mr. R. B. CHALMERS (Alva) then read his paper, which was entitled—

NOTES ON MONEY-SAVING DEVICES FOR SMALL GAS-WORKS.

In bringing before you this subject, I think the better way would be to describe a few of the appliances in use at the Alva Gas-Works.

Beginning in the retort-house, I was troubled with thick tar collecting in the hydraulic main; and not being blessed with a tar-column, I hit upon the following plan in seeking a remedy for this defect. Being one day in a plumber's yard, I saw lying on the scrap heap an automatic flushing cistern as used in old-time lavatories, and purchased it for 5s. This I erected at one end of the hydraulic main, and connected it to a supply-pipe from a small liquor pump used for supplying liquor to the scrubber. The tank, of 5 gallons capacity, was adjusted to empty five times in an hour, and the outlet connected to a seal-pipe in the main. As the difference in the levels of tar and liquor in the separator in the tar-tank was fully 2 inches, I adjusted the tar-overflow of the hydraulic main to 2 inches below the liquor level in same, by this means ensuring that tar would leave the main first and leave a liquor seal only. As the flushing tank supplied about 25 gallons of liquor per hour, and the amount of tar deposited was only a few gallons, a constant liquor seal was assured for the dip-pipes, and all tar was constantly flushed out. The saving effected by this appliance was—the hydraulic main required very little attention, less gas was lost by leaking retort-lids owing to the uniform seal, and so far no deposit of carbon has been found in any of the retorts.

Passing the condensers to the exhauster-house, I here fixed on each exhauster three 1 pint automatic sight-feed lubricators, with seal-pipes of my own design, ensuring constant and uniform lubrication. The steam, before entering the engine-cylinder, is dried in a home-made steam-drier. This consists of a cast-iron box 6 in. by 6 in. with cover bolted on. The steam on entering the side of the box is divided into two streams, by means of an M.I. T-piece, and impinges on the sides of the box, thereby depositing any water, which drains to a trap connected to the bottom of the drier. The dry steam is taken from the top of the drier to the engine. The result of this is that the packing around the piston and slide-valve rods lasts indefinitely, and the rods do not get scored with the action of water. Efficient lubrication of the cylinder and rods is more easily accomplished, and the packings now in use have not been touched for two years and are still perfectly steam-tight.

As to the Livesey tar-extractor and washer, I have here fixed a row of steam-jets inside the casing—one jet entering the bottom division of each perforated tube; and now the whole apparatus can be steamed and cleaned in a few minutes without any trouble, and every tube is sure to get its own share of steam.

Passing the scrubber to the oxide purifiers, I may say I have been very successful here. Our last clean purifier was turned on to work in October last year, and is not passing dirty gas yet. During that time it has passed 25,000,000 cubic feet of gas. The oxide used is Albion oxide mixed with soft wood sawdust, 40 bushels to the ton. The oxide is in two layers of 2 feet, and gives no trouble with back pressure. The air used for revivification is put in at the inlet to the purifiers. The holder pressure being about 4 inches, I had to use some positive means of injecting the air; and not wanting to buy a rotary blower, as it would require power to drive, or use a steam-injector direct, because of the steam wetting the oxide, I adopted the following plan. I had two 9 feet lengths of 4-inch cast-iron flanged pipe; and bolting these together, and flanges on each end, I inserted a length of 2-inch M.I. steam-tube, thus forming a jacket round the 2-inch tube. This condenser was laid on the floor of an old lime-shed; and from the top of each end of the jacket was carried a 1-inch pipe to the gasholder tank, the top of which is 6 feet above the apparatus. One tube enters the tank 1 inch below the water-level, and the other 2 feet lower down. Into one end of the 2-inch pipe is fixed a small air-injector, worked with steam. The mixture of air and steam travels through the pipe, and all the steam is condensed by means of the cold-water jacket. As the jacket water heats, the cold water flows from the tank down the lower pipe, and returns warm through the upper pipe. This ensures a constant supply of cold water to the jacket; and the steam being all condensed, there is a good supply of practically dry air. The condensed steam flows to waste through a seal-pot. The warm water returning to the holder tank saves using live steam to prevent freezing in time of frost. The air passes through a 20-light meter, fitted with a 1-minute observation dial and back-pressure valve. The steam used for working the injector does treble work, as it heats the benzol carburettor, works the injector, and heats the holder water. I find 2 per cent. of air at the purifier-inlet does more real revivifying than 4 per cent. at the inlet of the condensers.

Steam is used for heating all the buildings in the works; and we have a very efficient steam system. The boiler is of the Cornish type, fitted with Meldrum's furnace. We use all sweepings and breeze for fuel. The boiler-flues are built extra large, so as to give slow travel to the waste gases. The feed water is heated to 180° Fahr.; and this gives great economy. The exhaust steam from the exhauster and scrubber engines, tar-pump, and feed-pump is collected in a cast-iron box 2 feet deep by 18 inches diameter. In this box is fixed a coil of copper tube 1 inch diameter by 20 feet long. This box is placed 2 feet below the feed-water tank, which holds 200 gallons; and the bottom end of the coil is connected to the bottom of the tank, and the top end 2 feet higher up. The water in the tank constantly circulates through the coil, and thereby gets heated. The feed-pump, which is a 2-inch Tangye duplex, is supplied from this tank; and the supply pipe leaves the tank half-way up the side. On this pipe inside the tank two knees are fixed forming a swivel joint. Into this joint is screwed 2 feet of tube; and on the end of this is fixed a T-piece and an 8-inch copper float. The float keeps the T-piece end of the delivery pipe drawing water from the top of the tank; and as warm water is lighter than cold, the pump is always being fed with the warmest water in the tank.

The cold-water storage tank, of 1200 gallons capacity, is on pillars 16 feet high, and is fed through a float-valve from the town mains. From this tank a 1-inch pipe takes the water to the feed tank. This 1-inch pipe is encased in a 2-inch, and then in a 3-inch pipe. The 1-inch pipe is connected to the bottom of the storage tank, and the 3-inch to the same tank 2 feet higher up. The surplus exhaust steam flows through the space between the 1-inch and 2-inch pipes. The cold water flows through the 1-inch pipe, and returns to the tank through the space between the 2-inch and 3-inch pipes, condensing all the exhaust steam, and enters the storage tank very warm indeed. This preliminary heating deposits a large proportion of the solid matter in the water, and helps to prevent the formation of scale in the boiler; also it drives off the gases dissolved in the water, and thereby prevents grooving and pitting of the boiler-plates. To prevent any scale being deposited in the boiler, a small quantity of ordinary treacle is put in the feed water every morning, and the boiler is blown off every two days. The inside never requires chipping. This hot water feed is a great economy; and I think we are saving about 15 per cent. of fuel. All the appliances were fitted up by our staff.

The boiler is worked up to 80 lbs. pressure; and the steam is reduced to 40 lbs. for the works, and to 30 lbs. for the retort-bench. This gives us very dry steam, at a constant pressure, and greatly facilitates the regulating of the engines. All the steam-mains are fitted with expansion-joints; and we have no trouble with steam-joints leaking.

As you know, 1 inch should be allowed for expansion in every 50 feet of steam-pipe; and if not provided for, leaky joints are sure to be the result. The steam-pipes all drain to steam-traps, so as to get clear of condensed water, and thereby prevent water-hammer and burst pipes and joints; and being covered with

non-conducting composition, they give no trouble. The steam used for heating some of the buildings passes through a coil of 1-inch pipe inside the cart-weighing machine; and this keeps it dry and prevents rusting.

The coke-quenching plant consists of two 20-gallon tanks fixed 13 feet high; each tank being fitted inside with a syphon and connected to two copper roses, 15 inches diameter. The stoker pushes the coke-barrow under the rose, and pulls a handle; and the tank empties through the syphon, shuts off automatically, and refills ready for the next barrow.

[The author very fully and skilfully illustrated his remarks by drawings on the blackboard.]

Discussion.

Mr. A. WADDELL (Dunfermline) expressed his pleasure that the members had come to Dunfermline. Referring to the paper, he said that Mr. Chalmers had, he considered, laid a number of most interesting matters before the meeting.

Mr. W. B. M'LUSKY (Perth) said it seemed to him that the seniors in the gas industry were indebted to the juniors for meeting in the way they did, as their gatherings were very instructive. He had been very much struck with the paper read by Mr. Chalmers. What he had brought before the members would be useful to everyone; at all events, there was something in the paper which would be of use to some. He had been able to assemble a good many devices, and had shown them what he had succeeded in doing. He thought that in the method of treating the feed water, and not only economizing steam but preventing nuisance, Mr. Chalmers' contribution to their "Transactions" had been very valuable. The author did not make one point, which was very important. He did not mention how he trapped the grease, which sometimes gave considerable trouble.

Mr. J. D. KEILLOR (Lochgelly) was sure the members all appreciated Mr. Chalmers' paper, and would agree with him that it was unique in more ways than one. He thought the author was entitled to their congratulations for the success of the various devices—they might say his own inventions—employed by him with a view to effecting economy. Economy was a subject to which they had all given serious consideration; and in these days of keen competition it was perhaps more necessary than ever. It was not good enough to say—but he supposed there were some who did say it—that so long as they were able to make large profits to pay high dividends there was no need for anything else. Gas plant was not in such a state of perfection that stringent attention to details was unnecessary. No doubt modern plant was made with a view to economy; and it demanded more careful attention than ever. He would like to ask Mr. Chalmers a question about the size of his purifiers, and how many he had.

Mr. FORBES WADDELL (South Queensferry) said the first thing that occurred to him to do was to congratulate Mr. Chalmers on the clearness and conciseness of his paper. He had certainly done himself credit, and by his blackboard illustrations had made his communication a good deal easier for the members to follow. The simplest arrangement for the hydraulic main overflow would, of course, be the best to adopt; and all the time he had been a gas manager he had used a syphon or a U-pipe to take the tar from the bottom of the main. The liquor never got down to the bottom; there was never any tendency for it to get down underneath the tar. At South Queensferry, five years ago, he fitted up the hydraulic main with a U-pipe; and it was a much simpler arrangement than Mr. Chalmers had mentioned. The liquor overflow and the tar overflow were quite separate; and, in his experience, this worked with absolute reliability. In regard to the arrangement for condensing the mixture of air and steam going to the purifiers, if they considered it necessary that the water should be taken out, it was a very clever idea; but he had this experience, that when he put purifiers into the works at Forfar—they were 18 feet square, and big when compared with the make—he found that it was necessary to introduce live steam into them to get the purifying material warm enough. If they had purifiers of ample size for the make, it occurred to him that the steam heat would be better spent on the material inside the purifier. He was not troubled with the water; it was simply drained off in the ordinary way. If they required to warm up the purifiers, the steam, when it went into the purifiers, would liquefy, and give up its nascent heat. In his experience, this had proved of very great value. [Mr. Waddell, on being requested to do so, sketched on the blackboard his arrangement for the tar and liquor overflow, and mentioned that the relations of the tar and liquor never varied from year to year. He considered that if a simple arrangement could be got, there was no need to have an elaborate one.]

Mr. R. W. COWIE (Dalkeith) said Mr. Chalmers had been very considerate with the members in the matter of time, because no doubt he had at Alva quite a number of other appliances and arrangements which he could have shown them, and in which they would have been as much interested as they had been in those he had brought before them. He had had the pleasure of going through the Alva Gas-Works more than once, when the various appliances had been pointed out; and on no occasion did he find any of them sticking. Whatever system of working they adopted, they had to make it suit their existing connections; and Mr. Chalmers had shown his genius by, wherever he found a natural law, bringing it into play, in his arrangements.

The PRESIDENT added his appreciation of Mr. Chalmers' paper. He said it was one which had the merit of appealing to the members in this respect—that they all had similar problems confronting them at some time or other; and Mr. Chalmers had proved to them that if apparatus were effective it was not necessary that it should be elaborate or expensive. In fact, he clearly made out a case for the home-made article; and if a gas manager could save many pounds by the exercise of a little ingenuity in utilizing a waste product, such as exhaust steam, he would be appreciated. Mr. Chalmers had shown them a method of flushing the hydraulic main by which the pitching of the tar was prevented; and he was to be congratulated upon the arrangement. In this respect he (the President) considered Mr. Chalmers was ahead of many larger works. The idea of injecting air into the purifier, in conjunction with the heating of the water, was an ingenious one. He fancied it would be easy to adopt the same principle in supplying water to a boiler. He would add that they had greatly appreciated Mr. Chalmers' drawings on the blackboard. It said much for him that he had gone out of the beaten track in the matter of illustrating his paper. He asked the members to give Mr. Chalmers a very hearty vote of thanks for his paper.

Mr. CHALMERS thanked the members for their vote. He said he had absolutely no trouble in getting quit of the grease in the water. The exhaust at no time came into contact with the feed water. His purifiers were 15 feet square and 5 feet deep. Originally built to contain four layers of lime, each 1 foot deep, he now used only two layers of oxide, each 2 feet deep. He had never found it necessary to heat up the purifiers in any way to get the requisite purification. He once, by way of experiment, connected a steam-pipe with a purifier, put in a very small quantity of steam, in a short time took off the purifier, and found that the bottom layer of the material was like mud, and was causing back-pressure. He therefore did not require any steam at all. He found that, with the air entering at the inlet and oxidizing the iron, there was sufficient heat to do all that was wanted in the purifier. The only difference between his method of providing for the overflow from the hydraulic main and that described by Mr. Waddell was that the flushing-tank was fitted on to one end of the main, the liquor overflow at the far end, and the tar overflow one-fourth of the distance along. The liquor running in gave a flow of liquor to the far end of the main; and at the same time, if they should be working with wet coal or at high heats, and less tar was being formed, he found that, using a tar overflow adjusted as low as 2 inches down, the liquor was apt to overflow, but by using the liquor flushing-tank it was made sure that the thing could not become unsealable.

Mr. M'LUSKY added that he thought there was nothing better than a column—a plain pipe standing at the end of the main, with all the tar gathering into it. It could be cleared out twice a week; and there would be absolutely no thick tar in the main at any time.

At the close of the discussion,

The PRESIDENT intimated that the Council agreed to vote £5 towards the purchase of books for a circulating library. Mr. Herring had sent two books of his own—"The Granton Gas-Works" and "The Construction of Gas-Works"—and had promised others. They expected the library to be ready for use by the members in about a month.

The visitors were entertained at "high tea" in the Royal Hotel. The President expressed their thanks to the Corporation of Dunfermline for allowing them to visit the gas-works, and for the hospitality which had been extended to them.

Establishing a Gas and Fuel Testing Laboratory at Vienna.

It is announced by the Board of Education in Vienna that a laboratory is being established at the Technical College at Vienna for the investigation of gas-lighting appliances, fuels, and heating plant. Its establishment is the result of representations made by the Association of Gas and Water Engineers of Austria-Hungary; and it will be attached to the Chair of Chemical Technology in the College, and will therefore come under the supervision of the Professor, Baron von Jüptner. The laboratory will be equipped with all necessary apparatus of the most recent type; and the work to be undertaken is intended to include the testing and photometry of burners and lamps of all kinds, the making of analyses for gas-works, and investigations for controlling the working of plant on gas-works which do not possess their own chemists, as well as the carrying out of exhaustive trials of new apparatus and new inventions relating to methods of lighting other than electrical. Heating appliances, especially gas-fires, will be examined, and fuel testing of all kinds for the control of furnaces will also be undertaken. The fees chargeable for the tests are to be low; and the hope is expressed that, accordingly, the services of the laboratory will be freely utilized, and that abatement of the smoke nuisance and economy of fuel may consequently be achieved as a result of its activities. As an experimental works, it is intended to work on the same lines as the experimental works of the German Association of Gas and Water Engineers at Carlsruhe. It will be provisionally established in old buildings of the Technical College; but when the re-building of the Chemical Institute is completed, there will be accommodation for the laboratory in that. The experimental works and laboratory will be under the immediate charge of Professor H. Strache. It is anticipated that the laboratory will commence work before the end of the present year.

REGISTER OF PATENTS.

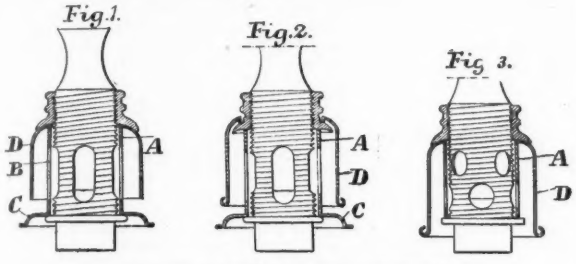
Burners for Incandescent Gas-Lamps.

LECOMTE, J. M., and ROY, M., of Paris.

No. 21,669; Oct. 13, 1908.

Under this invention, the perforated sleeve around the inlet pipe is secured in position by a nut screwed on to the lower screw-threaded part of the mixing-tube. This nut presses the sleeve downwards and holds it firmly on the flange of the injector, in such a manner as to prevent it from rotating.

Three forms of the burner are illustrated.



Lecomte and Roy's Incandescent Burner.

In fig. 1, the lower part of the mixing-tube is cylindrical in form, and is externally screw-threaded. It is perforated with holes for the admission of the air and surrounded by a sleeve A with a smooth body formed with corresponding perforations B, and which at its base comprises a milled washer C of large diameter. The lower edge of the sleeve rests upon the flange of the gas-nozzle, which is screwed into the base of the mixing-tube. A bell-shaped part D rests on the upper edge of the sleeve, and serves to conceal the holes in the sleeve, upon which it is held by a milled nut. The nozzle being screwed home and the nut being slackened, it is possible to regulate the air admission with precision by turning the sleeve by means of the washer C; and without releasing the washer, the nut is tightened so as to hold the regulating sleeve in place.

Fig. 2 shows that the bell D, instead of being held between the sleeve A and the nut, rests freely upon the latter. In this case, the bell can be touched without risk of disturbing the adjustment.

Fig. 3 represents a burner, the sleeve of which forms an integral part of the bell.

Purifying Gases Generated by Dry Distillation, and Obtaining Bye-Products Therefrom.

BURKHEISER, K., of Aix-la-Chapelle.

No. 21,763; Oct. 14, 1908. Date claimed under International Convention, Oct. 14, 1907.

This invention relates to improvements in the process described in patent No. 20,920 of 1908—see "JOURNAL," Nov. 2, p. 326. Substantially, that process consists in conducting the gas, after the separation of the tar, over a heated, continuously or intermittently regenerated oxidizing agent, so that the sulphuretted hydrogen is oxidized, to produce anhydrous sulphurous or sulphuric acid, which reacts with the nitrogen compounds to produce thio-ammonium salts. For the separation of the tar, or the greater portion of the tar, it is necessary to considerably cool the crude gas; and this causes a liquor to be deposited which contains a great amount of ammonia; also the so-called "fixed" ammonia—*i.e.*, ammonia combined with the acids (sulphuric and hydrochloric) present in the crude gas.

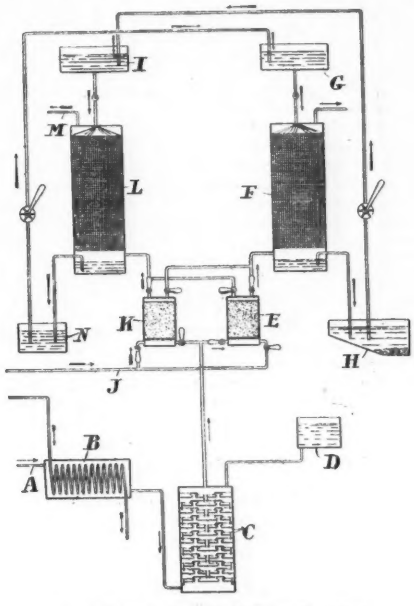
One object of the present invention is to recover this precipitated ammonia and incorporate it with the gas mixture to be treated by the process referred to; but no general claim is made to the recovery of ammonia from ammoniacal liquor by means of a stream of gas passing through the liquor to the purifier. Another object of the invention is to secure more effective or complete reaction of the anhydrous acid with the ammonia.

Several means of effecting these objects are described. One method of recovering the ammonia from the precipitated liquor consists in treating the liquor in the usual manner in a distilling apparatus, with steam and lime, and adding the vapours generated to the gas mixture. A modification of the method consists in separating the ammonia without steam, and charging therewith the crude gas or the air or oxygen used for regenerating the oxidizing agent. By this means, the carrying of a considerable quantity of water, and the presence of residual liquor, are avoided. For this purpose the ammoniacal liquor is heated in a suitable apparatus (distilling column), if necessary with milk of lime, or in the presence of some other substance adapted to decompose the fixed ammonia. Air, oxygen, coal gas, or coal gas mixed with air or oxygen, is then passed through the liquor, and becomes charged with ammonia, whereupon it is added to the gas to be treated in the oxidizing chamber.

In carrying out the process on a large scale, the heat of reaction is not sufficient to preserve the required temperature, so that continuous heating is necessary, and the requisite heat is preferably carried by the stream of ammonia-laden air, oxygen, or gas. If desired, the whole of the ammonia may be purposely separated before the gas passes to the oxidizing agent—for example, by means of a scrubber—and may then be re-added to the gas, with a stream of air. This method may be convenient where ammonia washers and the like are already available when the process is adopted.

A modification of the process, with intermittent regeneration, consists in bringing the streams of gas and air alternately into contact with a washing liquid after passage over the oxidizing agent, so that the liquid alternately absorbs constituents from the gas and the air. During the passage of the gas over the oxidizing agent, the sulphur combines with the iron, and the gas carries free ammonia into the washing liquid. During the passage of the air over the oxidizing agent and sulphur compounds, anhydrous acid is formed; and this acid is then carried to the liquid. The ammonia carried by the gas and the acid carried by the air are both given off to the washing liquid, and combine therein. The washing liquid gradually becomes saturated with thio-ammonium salts, without containing at any stage of the process any great excess of free acid or ammonia. The slight alternate excess of acid and ammonia renders the liquid more capable than pure water or the like of absorbing the ammonia and acid.

To allow of continuous working with intermittent regeneration, separate chambers containing oxidizing agents are preferably used, with a washer for each; and the washing liquid is kept in continuous circulation through both washers. Each chamber is alternately traversed by air and coal gas; air passing through one chamber while coal gas passes through the other. The gas and air are separately treated in the washers; but the circulation of the liquid brings the acid and ammonia together. While the gas is passing out of one washer, for further use, the residual nitrogen is passing out of the other washer into the atmosphere. When the oxidizing chambers are changed the washers are also changed, so that the process is continuous.



Burkheiser's Dry Distillation Purifier.

Apparatus for carrying out the process in this manner is diagrammatically illustrated.

The coal gas, free from tar, flows by the pipe A into a chamber B, heated by a steam-pipe. Thence the gas flows into a distilling apparatus C, in which it absorbs ammonia from ammoniacal liquor supplied from a tank D. The gas then flows into the oxidizing chamber E, and thence to the washer F. In F the ammonia is washed out of the gas by liquid flowing from a tank G; and this liquid then flows to a tank H, whence it is pumped to a tank I.

While the gas is being treated in this manner, air is flowing from the pipe J into the oxidizing chamber K, where it becomes laden with acid, and thence to the washer L, from which the residual nitrogen is discharged at M. The liquid flowing from the tank I, through the washer L, absorbs the acid, and then flows to the tank N, whence it is pumped to the tank G.

When the oxidizing agent in the chamber E has become more or less saturated with sulphur, the functions of the chambers K E are reversed by closing the respective cocks and opening others.

The proportion of acid to ammonia can be regulated. If the proportion of sulphuretted hydrogen is higher than required for furnishing the amount of acid capable of reacting with all the ammonia present, part of the acid-laden air may be separated and discharged into the atmosphere, or used for a separate purpose. If the quantity of acid is too small, additional acid from another source may be introduced into the washing liquid. Any kind of washing apparatus may be used, provided that the gas and air are brought into intimate contact with the liquid, either by causing the finely-divided liquid to act on the stream of gas or air, or by dividing into fine streams the gas or air, and causing it to pass through the liquid.

If the ammonia is taken from the ammoniacal liquor by the stream of air which is used for regenerating the oxidizing agent, the process of regeneration is accompanied by the formation of thio-ammonium salts, which are subsequently absorbed by the washing fluid. In this modification of the process, the whole of the ammonia may be separated by any suitable means from the crude gas, and then added to the regenerating air. In this case, the passage of the gas over the oxidizing agent is accompanied only by the combination of the sulphur with the iron. When the ammonia-laden air passes through the chamber, the sulphur is oxidized, and the sulphurous anhydride combines with the ammonia. The ammonia which remains free is absorbed by the washing liquid; and any residual acid in the oxidizing chamber is carried out by the stream of gas which follows the stream of air.

Treating Tar to Facilitate Subsequent Distillation.

GUTENSOHN, A., of Pigot Street, E.

No. 21,800; Oct. 15, 1908.

This invention relates to treating gas tar with a solution of chromic and sulphuric acids; the action of the acid solution when the tar is mixed into it creating a sufficient degree of heat by oxidation within the body of the tar to cause the light oils—such as benzol and benzoline—to distil off.

The proportions of the acids and tar employed in the process are as follows: One part by weight of chromic acid is dissolved in two parts by weight of water, so as to form a strong solution which is left to settle for twenty-four hours, and then there is gradually added to the solution 2 per cent. by weight of concentrated sulphuric acid. Then there is added gradually to 100 lbs. of the acids solution about two-thirds of its weight of gas tar and the whole stirred up. The result of this treatment of the tar before the usual heat distillation for the extraction of the heavy oils and the recovery of the pitch, is said to be that the light oils pass off in fumes and are in a very pure state when condensed. After the light oils cease to pass off, the solution is drawn off, which removes from the tar the cause of its bubbling over during distillation. The pitchy residue is then distilled by heat at a lower temperature—say, one-third less—than is usually employed in the distillation of gas tar, so as to recover the heavier oils. The pitch then obtained is "of a high quality and better suited for waterproofing textile material, being somewhat elastic."

A modification of the above process (to enable a weaker solution to be used) is as follows: Chromic acid is diluted with hot water to give a strength of about 10° Beaumé, and then sufficient sulphuric acid is added until the solution reaches 12°. Then the tar is gradually run into the solution, keeping the whole stirred up. The vessel holding the solution and tar is then closed and left without further disturbance for about twenty hours. Various constituents of the tar will have then become absorbed into the acid solution, and others will be suspended in it, all of which are carried off by the solution when it is withdrawn—the pitchy residue being pressed to recover any solution it may hold. The solution is then passed into a suitable still and subjected to distillation at low heat—varying up to 212° Fahr.—by which the highly inflammable oils (benzol and benzoline) held in the solution pass off as vapours and are conducted to a condenser.

If the treated tar is found not to have given up the whole of its light valuable constituents, it is only necessary to heat the pitchy mass to a sufficient degree of heat to drive them out and conduct them to a condenser. The pitchy mass is then heated up to 300° Fahr., which converts it into a "very high quality pitch."

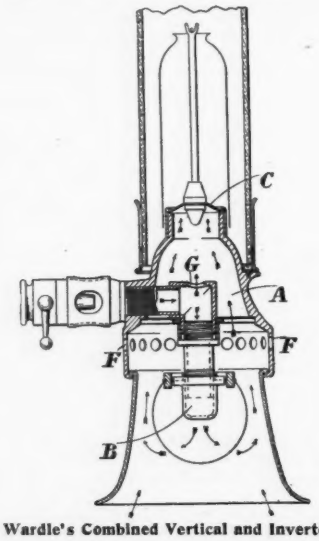
The solution, after the above treatment, may either be treated to recover the chromic acid in the usual way by heat or be boiled to dryness, and the residue calcined, which gives a "valuable green pigment free from arsenic."

Gas-Burners.

WARDLE, G., of Lever Street, E.C.

No. 21,961; Oct. 17, 1908.

The object of this invention is "to utilize the spent gases resulting from the combustion of gas in one incandescent burner, or sets of burners, by conveying the gases into a mixing, distributing or regulating, or diffusing chamber of another incandescent burner, or sets of burners, where they are revivified or regenerated and rendered recombustible by the ultimate and intimate admixture with a small incoming supply of gas or any other inflammable vapour mixed with air."



Wardle's Combined Vertical and Inverted Gas-Burner.

The illustration shows the application of the invention to a double incandescent gas-burner.

A is the intermediate mixing-chamber and B and C ordinary inverted and vertical incandescent burners. Gas is led to the inverted burner from the mixing-injector E and burner-tube attached. The chamber A is dome-shaped, and is so arranged in relation to the inverted burner that the whole of the products of combustion pass up into the chamber, where they are again mixed with additional air from the inlet openings F and gas from the orifice G. The products of combustion are thus "recarburetted, regenerated, or revivified in the mixing-chamber by the addition of a small percentage of fresh gas and air; and they then pass upwards to be utilized and consumed afresh in the vertical burner."

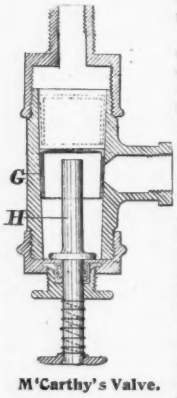
The advantages of the invention are said to be "manifest, inasmuch as two or more incandescent burners can be worked economically with only the gas consumption of one burner (necessary to produce the initial spent gases) *plus* a small jet of gas and air or gas supplied to each additional burner for the purpose of revivifying and regenerating and rendering combustible the spent gases to be consumed."

Automatic Closing Valve for Gas.

M'CARTHY, M., of Cardiff, and M'CARTHY, P., of Blaengwynfi.

No. 22,477; Oct. 23, 1908.

This automatic cut-off for gas consists of a valve which is opened by hand and shuts automatically when the gas pressure is decreased or withdrawn.



M'Carthy's Valve.

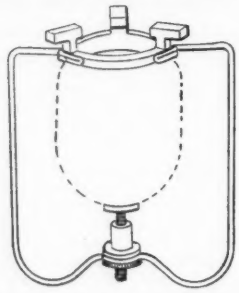
It consists of a conically bored cylinder or chamber attached to the gas-pipe or bracket by an ordinary branch about the centre. A thimble G (which operates as a valve and is conical shaped) completely blocks the passage of gas from the gas-pipe and closes the inlet port. To connect the gas, the jet is opened in the ordinary way and a rod H, which passes through the bottom cover and stuffing box, is pressed up so that the top end of it touches the head of the thimble on the inside sufficiently to raise it from its seating. Immediately the thimble is raised, the gas is allowed to pass between the cylinder and thimble through the inlet, and at the same time the pressure of gas underneath the head of the thimble keeps it in a floating position in the upper part of the chamber, as shown by the dotted lines. Gas meanwhile passes between the outside wall of the thimble and the inside of the cylinder—eventually flowing through the top outlet to the burner. When the gas is turned off, the thimble instantly drops into position in the chamber, shutting the inlet port, and thereby preventing the escape of gas from the fitting until pressure is again exerted on the head of the rod, causing it to fall back to its original position by the assistance of a spring around the rod.

Supporting Inverted Incandescent Mantles.

BEAL, W., of Birmingham.

No. 141; Jan. 4, 1909.

This mantle-support is formed of wire (as shown) so shaped as to clip on to the refractory ring at the top of the mantle and to extend down below it. The wire portion carries a central vertical adjusting screw with a dished head immediately underneath the central part of



Beal's Inverted Mantle Support.

the bottom of the mantle and touching, or almost touching, it. The mantle is thus supported in case of fracture, and the lower part of the mantle is prevented from falling away.

Vertical Retorts.

ROBERT DEMPSTER AND SONS, LIMITED, and TOOGOOD, H. J., of Elland.

No. 28,201; Dec. 28, 1908.

This invention relates to intermittent vertical retorts, in which the charging is effected in a single operation; and concerning it, the patentees say: "It is well known that, in such a retort, during the process of carbonization, the charge of coal becomes less porous at certain stages of carbonization; so that the gas produced in the lower portion of the retort has a difficulty in reaching the outlet. For this reason, it has been proposed to provide the lower end of the retort with a separate auxiliary outlet; and it has also been proposed to make two retorts in one fire-clay block having a common outlet arranged between them—the retorts thus formed being charged and discharged simultaneously. We consider, however, such an auxiliary outlet would be very liable to become choked, and would then be difficult to clear."

They therefore propose to form a passage from the bottom mouthpiece of each retort to the bottom mouthpiece of the retort facing it in the next row; this passage being controlled by a valve or seal arrangement which is closed or sealed during the charging and discharging of either retort, but open at other times. Then, supposing the charge in the first retort to have been in for (say) four hours (or about half the time required for carbonization), and the charge in the second retort to be newly put in, the respective charges in different stages of carbonization will be also of different porosities, and the gas from either retort takes the path of least resistance to either outlet, whereby the yield of gas is increased and its quality improved or rendered more uniform.

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GREATLY REDUCED GROUND SPACE PER 1000 Cubic Feet OF GAS MADE

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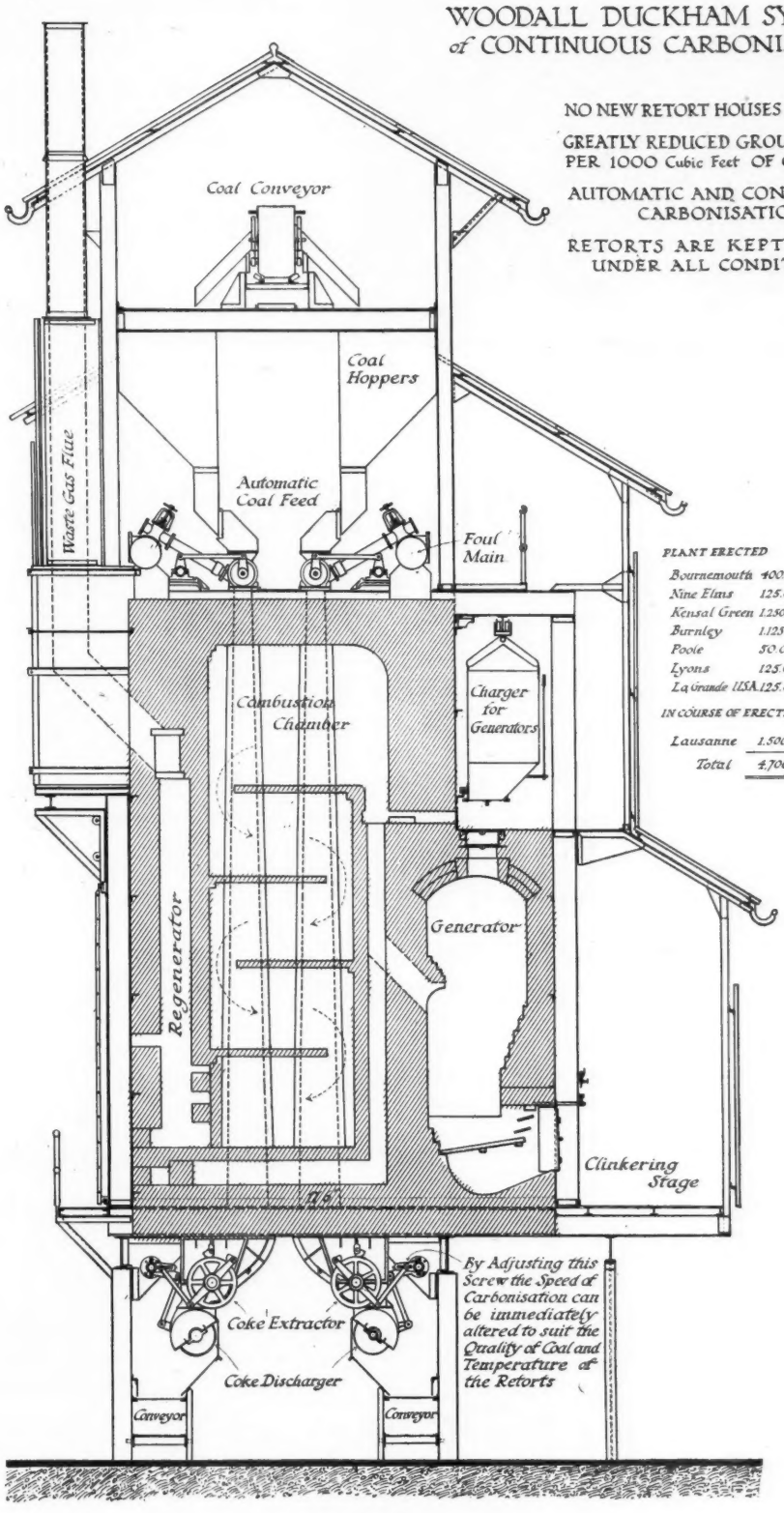
RETORTS ARE KEPT CLOSED UNDER ALL CONDITIONS



PLANT ERECTED

Bournemouth	400.000	cubic feet per diem
Nine Elms	125.000	
Kensal Green	1.250.000	
Burnley	1.125.000	
Poole	50.000	
Lyons	125.000	
La Grande USA.	125.000	

IN COURSE OF ERECTION

Lausanne	1.500.000	
Total	4.700.000	

— CROSS SECTION —

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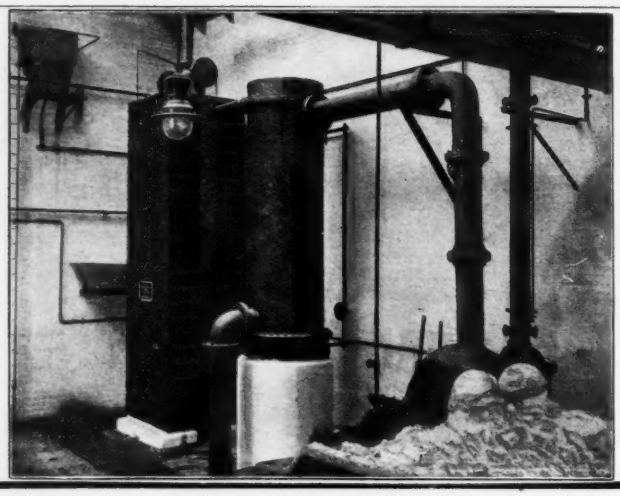

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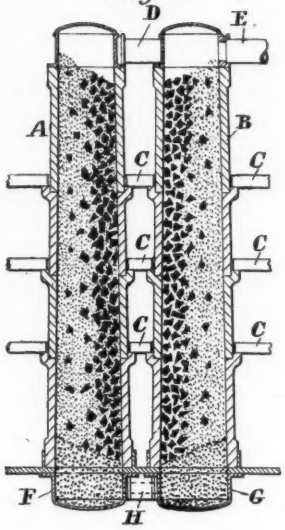
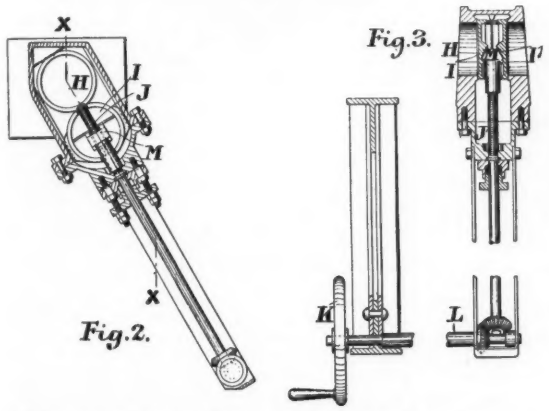
No. 12426. Length over all, 24 inches.

J. & W. B. SMITH, 17-23, Farringdon Road, LONDON, E.C.

The arrangement is especially useful in conjunction with the method of feeding vertical retorts described in Patent No. 19,437 of 1908, in which the coal fed into the retorts is arranged in separate columns, concentric or side by side—the nuts predominating in one column and the slack in another column.

Fig. 1.





Dempster and Sons and Toogood's Vertical Retort Arrangement.

Fig. 1 shows, in vertical section, a pair of retorts A B, each of which may be built in four or other number of tubes united by spigot and socket joints; the floors or partitions C dividing the setting resting upon the sockets in such manner as to allow for independent expansion of each tube. The retort A has the usual outlet pipe D; and the retort B the usual outlet pipe E. The bottom mouthpiece F of the retort A is connected to the bottom mouthpiece G of the retort B by a passage H, capable of being closed at will by a valve or other seal—such mouthpieces being preferably filled with coke in the usual manner before the introduction of the charge of coal.

Figs. 2 and 3 illustrate, in section, a device for controlling the passage H. Fig. 2 shows the passage open, and fig. 3 the passage closed—the latter figure being a section taken on the line X of fig. 2. This device comprises a double disc valve I actuated by the stationary screw-threaded spindle J rotated by bevel-gearing from the hand-wheel K at the front of the bench. The spindle is inclined so as to allow the shaft L to be placed in such a position as to avoid interference with the discharging of the retorts. A tapered or conical head M may be employed to force the two discs I I^1 outwards when closing the valve, so as to secure a tight joint; the withdrawal of the head easing the discs during the operation of opening the valve.

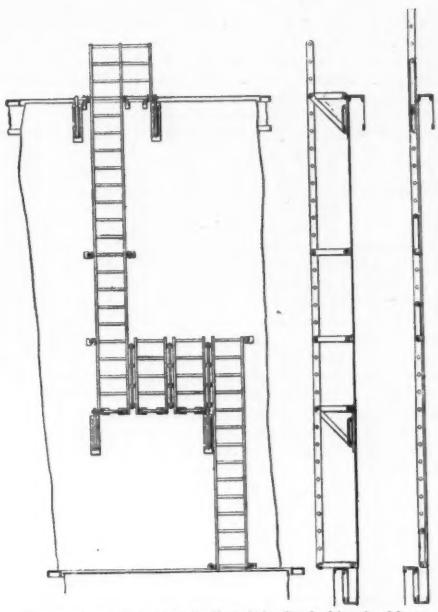
Ladders for Gasholders.

Downs, J. H., of Dipton, and Wright, H. F. (C. & W. Walker), of Donnington.

No. 9484; April 21, 1909.

The object of this invention is to provide gasholders with ladders, which will allow men to pass up and down them and between them and the sides of the lifts, and which can be folded up against the sides of the lifts when not in use. The ladder proper is connected to the lift of the holder by links, hinged respectively to the lift and to the risers of the ladder. Struts are also hinged to the risers; the other ends of the struts being capable of rising and falling in guides which constitute supports for the struts when the ladders are in position for use.

The ladder may be in one length, or it may be in lengths in different vertical planes and with short lengths affording means for passing from one length to the other as described in patent No. 9482 of 1909. The risers of the ladder have hinged links to them and to projections fixed to the lift of the holder. Hinged also to the risers are struts, the inner ends of which are provided with pins to engage slots in guide-



Downs and Wright's Collapsible Gasholder Ladders.

pieces secured to the lift of the holder. When the ladder is in position for use, these pins rest on the lower ends of the slots and act as diagonal supports for the ladder; the links acting as horizontal supports. When the ladder proper is folded up, the pins rise in the slots and the parts take up the folded position shown in the last illustration. The ladder may be operated to bring it to its position for use (and its folded position) by any suitable arrangement—such as a hand lever with cranks and rods, or wire ropes, or chains—after the way, for example, in which railway signals and points are operated. The parts of a ladder arranged as shown constitute practically one ladder as far as folding and extending for use are concerned, because all the parts, being connected as shown, will be folded and extended simultaneously.

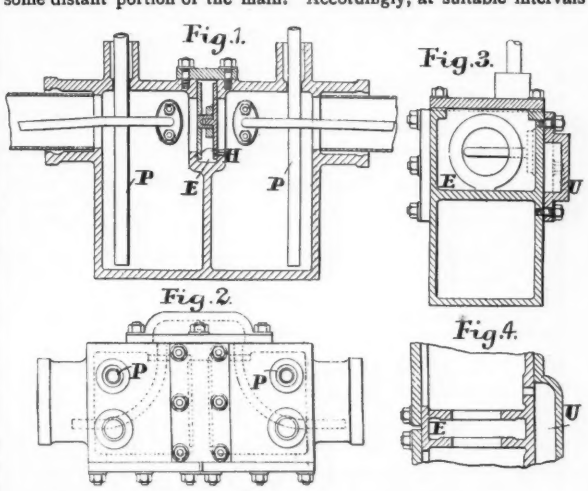
A modification has the treads formed by pieces hinged to projections fixed to the lift of the holder and formed next to their inner rounded ends with a flat part bearing on a projection fixed to the lift of the holder. The treads are connected by a wire-rope or chain, and can be folded and extended by any suitable means.

High-Pressure Gas-Mains.

Waddell, A., of Dunfermline, and the Bryan Donkin Company, Limited, of Victoria Street, S.W.

No. 10,941; May 8, 1909.

In the distribution of gas under high pressure, the patentees point out, it is desirable to provide means for enabling lengths of main to be tested, for trapping condensation liquid at intervals throughout the main for removal when necessary, and for governing the compressing pump so that it maintains the required minimum pressure at any portion of the main—preferably the least adequate, which is likely to be some distant portion of the main. Accordingly, at suitable intervals



Waddell and Donkin's High-Pressure System Junction Boxes.

throughout the main, they provide junction boxes connecting sections of the main, each having a partition formed with an opening which can be closed by the insertion of a valve or stopper when testing, a condensation liquid blow-off pipe from the bottom of the chamber on each side of the partition, and a passage from side to side of the partition forming a communication between lengths of small-bore tubing arranged in the mains and serving to transmit the gas pressure from a distant part of the main to the operating device of the throttle-valve or other controlling device of the compressing pump engine.

Fig. 1 shows, in vertical section, a junction box made according

to this invention—similar to fig. 4 of the illustration that was given in the "JOURNAL" for Aug. 3 (p. 325) in connection with Mr. Waddell's North British Association paper. Fig. 2 shows the junction box in plan. Figs. 3 and 4 are sections. The junction box consists of a casting, the end walls of which have cast on them outwardly projecting faucets adapted to receive the ends of the main pipe sections. Midway between the end walls, the box is formed with a transverse partition that extends from the top to the bottom of the box, and the upper portion of which is formed with double walls, which, with the side walls of the box, constitute a chamber E normally in free communication with the chambers of the box at each side of the partition through holes formed in the partition walls—the diameter of the holes corresponding to the bore of the mains, so as to avoid throttling of the gas. The upper end of the chamber E is closed by a removable cover; and in order to isolate a section of the main, for testing purposes or otherwise, the cover can be removed and a valve or stopper H inserted to close the holes of the partition.

In the construction shown, this stopper comprises two plates adapted to rest in a gas-tight manner on fixed beads surrounding the holes. A centrally arranged pin on one plate extends into a guide sleeve on the other plate; and for the purpose of forcing the plates against the faced beads, the sleeve is externally screw-threaded, and on it is fitted a nut that can be screwed against the back of the other plate.

The faucets are arranged near the top of the box, so that at each side of the partition a condensation liquid trap is formed from which the liquid can be blown out at intervals through vertical pipes P. The pipes R are of small bore, and contain gas under the pressure existing at a distant portion of the main—communicating with the governing device of the gas-compressing pump-engine. The pipes at each side of the partition are placed in free communication with each other through a bye-pass passage U constituted by a shallow box-like casting fixed in a gas-tight manner to the side of the main box. Each end portion of the pipe is connected to the inner wall of the box in line with a hole communicating with the passage U, by means of a flange and studs and nuts, or by a loose union. To enable these studs and nuts to be manipulated, the opposite side of the box is formed with openings that are closed by removable covers.

APPLICATIONS FOR LETTERS PATENT.

25,052.—CLEGG, D. T., "Gas-retorts." Nov. 1.
25,063.—LOGAN, H. T., "Mantles." Nov. 1.
25,081.—GAS-LATERNEN-FERNZÜNDUNG SYSTEM DR. ROSTIN, G. M. B. H., "Gas lighting apparatus." Nov. 1.
25,101.—HARRIS, H. W., "Lighting and extinguishing gas." Nov. 1.
25,104.—ROBIN, J. T., "Packing mantles." Nov. 1.
25,123.—BREITKREUZ, R., "Valves for water-pipes." Nov. 1.
25,142.—HUME, G. W., "Gas-controllers." Nov. 1.
25,150.—MASCHINEN-UND ARMATURENFABRIK VORM. H. BREUER AND CO., "Three-way pipes." Nov. 1.
25,162.—TRUEMAN, T., and RENOUF, P. L., "Two-way taps." Nov. 2.
25,187.—NEWHOUSE, W. A., and FITMENTS, LTD., "Atmospheric burners." Nov. 2.
25,197.—LEATHER, J. P., "Burners." Nov. 2.
25,257.—MIEVILLE, H. C., "Carburetting air." Nov. 2.
25,261.—MÜLLER, R., "Nozzles for burning gas." Nov. 2.
25,287.—BEST, W., "Regulating the gas supply to burners." Nov. 3.
25,298.—CHAMBERS, W. A., and BOOTH, W. H., "Production of gas from hydrocarbon oils." Nov. 3.
25,299.—PRITCHARD, F., "Contacting of vapours and gases with liquids and the like." Nov. 3.
25,302.—DEMPSTER, R., AND SONS, LTD., and TOOGOOD, H. J., "Coke trucks, barrows, or conveyors." Nov. 3.
25,339.—CHAMBERLAIN, C. W., and MAYHEW, E., "Gas-burners." Nov. 3.
25,360.—SIMONIN, H., "Utilization of materials employed for purifying illuminating gas." Nov. 3.
25,392.—POOLEY, H., "Taps or switches for gas-lights." Nov. 4.
25,393.—POOLEY, H., "Gas brackets or chandeliers." Nov. 4.
25,460.—PETTIGREW, G., "Sulphate of ammonia saturator." Nov. 4.
25,474.—GLASGOW, A. G., "Water-gas apparatus." Nov. 4.
25,496.—GARDNER, F., and EMMONS, F. J., "Meter lock." Nov. 5.
25,574.—DIER, F. F., and WHITCHER, W. C. W., "Electric gas-lighters." Nov. 5.
25,584.—SMITH, S., AND SON, LTD., and CAHILL, D., "Liquid meters." Nov. 5.
25,617.—WILLIAMS, J., "Fluid motor or pump." Nov. 6.
25,618.—SÜSSMANN, H., and MAYER, M., "Inverted high-power incandescent gas-lamp worked by compressed gas or compressed air." Nov. 6.
25,660.—HANSFORD, J., and WRIGHT, A. C., "Gas-governors." Nov. 6.
25,661.—ALLEN, T. G., "Acetylene generators." Nov. 6.
25,679.—DURANT, H. T., and METALS EXTRACTION CORPORATION, LTD., "Bringing a gas into contact with a liquid." Nov. 6.

Gas Shareholders on a Lighting Committee.—In the course of a discussion by the Bideford Town Council on the appointment of the Committees for the new municipal year, Mr. Heywood called attention to the fact that Mr. Clement, who was nominated for election on the Lighting Committee, was a shareholder in the Gas Company. He said he had himself been left off that Committee in previous years because he was an owner of shares in the Company. A resolution was then moved that both Mr. Clement and Mr. Heywood be appointed members of the Committee. Alderman Metherell, in supporting it, said he did not think the pecuniary interests of these gentlemen as shareholders in the Gas Company would clash with the interests of the town; and he was sure both would study the ratepayers. Both gentlemen were unanimously elected members of the Committee.

LEGAL INTELLIGENCE.

CONSTRUCTION OF UNAUTHORIZED WATER-WORKS.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, Nov. 8.

(*Before Lords Justices* VAUGHAN WILLIAMS, BUCKLEY, *and* KENNEDY.)

Attorney-General v. Barnet District Gas and Water Company.

As briefly recorded in the "JOURNAL" last week, judgment in this appeal, which was argued before their Lordships on the 19th ult. (see *ante*, p. 264), was given on the above-named day.

Lord Justice VAUGHAN WILLIAMS said in this case he had the disadvantage of not agreeing with his brethren. It was an appeal by the defendants against the judgment of Mr. Justice Ridley, giving a decision for the plaintiff, the Attorney-General, on the relation of the Marquis of Salisbury, and granting an injunction restraining the defendants from constructing, on a piece of land at Colney Heath, a well or other works for the purpose of raising, collecting, or storing water, and carrying it away for the general purposes of their undertaking. The defendants asked that judgment should be entered for them, or, alternatively, that there should be a new trial. The case of the Attorney-General was that the defendants would be acting *ultra vires*, and beyond the powers of their Acts of Parliament, under which they were authorized to construct water-works, if they sank the well in question, and executed the works connected therewith. The case for the defendants was that, under their Special Act of 1904, authority was given to them to sink a well and execute the works in question. For the Attorney-General, it was urged that all the defendants were empowered to do was to take water from the authorized water-works shown on the deposited plans. If, in connection with these works, and ancillary to them, they wanted to sink a well, they might do so; but they were not entitled, because they had power to purchase land by agreement, to go and purchase land in any part of their area of supply and dig a well there. The defendants relied on section 10 of the Act of 1904. Having read the section, his Lordship said it would be seen that the power to purchase land by agreement (in addition to any land authorized to be purchased by the Acts of 1872, 1883, and 1887, and the land in the parish of Shenley) was limited to land not exceeding 15 acres within the limits of supply. The powers given in respect of such lands were these: "The Company, may, on all or any of such lands, execute, for the purpose of, or in connection with, the water-works, any works and exercise any powers mentioned in, or conferred by, section 12 of the Act of 1847." There was also a power to purchase easements, upon which he would not say anything just at present, because he did not think it affected the judgment he had to deliver, but would limit himself to the consideration of the question whether under this section they were authorized to proceed with the well in question. It was contended for the plaintiff that the words "subject to the provisions and restrictions in this Act and the Special Act incorporated therewith, the undertakers may execute any of the following works," and gave them no power whatever to sink a well at some distance from the authorized water-works, and in reference to which no parliamentary power had been given. The argument of Sir Alfred Cripps was apparently based on the preliminary words of section 12 of the Act of 1847: "The undertakers may execute any of the following works for constructing the water-works," and coupled with them the words of section 10 of the Act of 1904 "may on all or any of such lands, execute for the purpose of, or in connection with, the water-works;" and he urged that these words limited the powers given by reference in section 10 to the powers conferred by section 12 of the Act of 1847, to the execution of works for constructing the water-works authorized by the Act. Before Mr. Justice Ridley, it was argued, on behalf of the defendants, that section 10 left these words out of the question altogether; but he thought *primâ facie* the meaning of section 10 of the present Act was to make it clear that, on any additional lands acquired by purchase under that section, the Company should have the powers given to them by section 12 of the Act of 1847, and not that they should have new or different powers unconnected with the construction of the works authorized by Parliament. He could not assent to the proposition put forward by Sir Alfred Cripps, that the proper construction of section 10 of the Special Act was decided by some of the previous cases. No case decided that Parliament could not, by any words, give general powers such as those contended for by the defendants; but it must be remembered that, for the protection of particular interests, these Acts generally only gave powers in respect of the lands specified by the deposited plans. It should be remembered, in construing clauses in Private Acts of Parliament, that it was one thing to infer the intention of the promoters who drafted the section and chose the words, and another thing to infer the intention of the Legislature when dealing with a Public Act introduced by those who presumably had no private interest to serve, and dealt with words chosen by the draughtsman in a public drafting department. The Water-Works Clauses Act of 1847 was a Public Act, and whenever the words of a Private Act seemed to involve a departure from the provisions of a Public Act, such construction *primâ facie* should be rejected. This observation applied with equal force to an argument on behalf of the defendants based on the negation in section 11 of the present Act of the right to sink wells in the additional land purchased by agreement in Middlesex, and contained no such negation in the case of Hertfordshire. The words of this section were chosen by the promoters and submitted to the Parliamentary Committee after the Committee had struck out of the Bill the clause giving express power to sink a specific well outside the district of the Company. He agreed with the proposition that the decision of the Frimley case was in no sense conclusive of the present; it was simply a decision on the Frimley Act, which differed from the Barnet Act, first because the Frimley Act only incorporated section 12 of the Act of 1847 by general words, while the words of section 10 of the Act of 1904 conferred specific powers which might be exercised by the Company on certain

additional lands which by that Act they were authorized by agreement to purchase and hold. Another difference between the Frimley Act and the present one was that the former, by the 23rd section, set out in detail the water-works which it gave the Frimley Company the power to make; whereas the Barnet Act contained no such section. Notwithstanding these differences, however, the Frimley case was a relevant authority to this extent, that Mr. Justice Swinfen Eady and the Lords Justices respectively all laid down general statements as to the practice of the Legislature in passing such Acts for the protection of the interests of individuals—a practice which included the deposit of plans and books of reference in cases in which public and private interests were likely to be affected injuriously. His Lordship then proceeded to read several passages from the judgments in the Frimley case, and repeated that he did not suggest for one moment that these judgments decided the present case—being judgments on a particular Act of Parliament; but he pointed out that both the learned Judge and the Lords Justices did lay down general principles on which it was said Parliament always acted in a matter of this sort. Apart from the observations he had quoted, he said there were one or two he should like to make as to the construction of Private Acts generally, and as to the construction of this one in particular. In his mind, there could be no doubt that, taking section 10 alone, it was capable of the construction put upon it by the Attorney-General; and this being so, it seemed to him that the language of such a section in a Private Act was to be treated as the language of the promoters, and that where any doubt arose as to the construction, the maxim ordinarily applicable to the interpretation of Statutes applied—viz., that words were to be understood most strongly against him who used them, and that the benefit was to be given to those who might be prejudiced by the exercise of the powers which the enactment granted, and against those who claimed to exercise them. It seemed to him, further, that sections 11 and 12, on which the defendants had so largely relied, ought to be treated as isolated, and foreign to the rest of the Act, and that their wording was not to be regarded as throwing any light on the construction. It was argued that section 10 intended that in the case of the purchase of land within the limits of supply not exceeding 15 acres wells should be sunk which were not referred to in the Special Act, and which might drain many wells in the surrounding district, though such wells were not included in the deposited plans or books of reference. If this were so, the interests of inhabitants of the district had no safeguard. The vendor of the particular piece of land purchased required no protection. But the inhabitants of the district generally might well require the protection which they would get if the sinking of the particular well were a power brought to the notice of Parliament and so to the notice of the public; and he did not think they ought, except by virtue of perfectly plain words, to construe the Act of 1904 so as to produce this result. One argument that was put forward on behalf of defendants was that by one or more of their prior Acts they not only obtained a clause very similar to the present one, which they presumed gave them power to construct their water-works, or part of them, on lands in respect of which there had been no plans deposited, and no mention made by the promoters of the Bill, but had also acted on the presumption, and dug wells to which no allusion was made in either the deposited plans or the book of reference. The answer to this argument was that it could not affect the mind of the Court in construing this particular section of the Act of 1904. It was probably true that some people thought such powers were conferred by these clauses. But the decision in the Frimley case had shown what the law was; and if there had been prior breaches founded on a mistaken construction put on a Special Act of a water company, it could not affect the construction of section 10 of the Barnet Company's Act. For these reasons, he thought the judgment of Mr. Justice Ridley was right, and should be affirmed.

Lord Justice BUCKLEY, in a long judgment, first reviewed the powers granted to the Company in the Acts obtained by them prior to 1904, under which they had, he said, in 1895, 1897, and 1905, sunk three wells, purporting to do so under the powers conferred. It had been contended by Sir Alfred Cripps that the sinking of all these wells had been *ultra vires*. In 1904, the Company obtained another Act giving them authority to execute further works, which were defined by section 4 to be the works authorized by the Acts of 1872, 1883, 1887, and that Act. It then proceeded by section 5 to empower the Company to acquire defined lands, and by section 6 to construct a further reservoir in a different part of the Company's area. This reservoir (the Arkley) had been built. The Act contained section 7—a section in some respects similar to, but in others differing from, section 8 of the Act of 1883 and section 7 of the Act of 1887. The relevant point of difference which he noted upon it was that whereas the last-mentioned sections had authorized the making of wells, this word was not to be found in section 7 of the Act of 1904. If the Act was to give power to sink wells for the purposes of the new reservoir, it must be found in some other section. Section 10 was one which might be described as combining the subject-matters which were dealt with in sections 14 and 16 of the Act of 1887. It empowered the Company to acquire additional lands and execute certain works. The particular words upon which the contest arose were those which empowered the Company, on all or any of such lands, to execute the works and exercise the powers mentioned in, or conferred by, section 12 of the Water-Works Clauses Act, 1847. The 10th section referred to lands taken by agreement under it, and to the lands authorized to be purchased by the previous Acts, as well as the land in Shenley mentioned in the present Act. The words "all or any of such lands" which followed applied, he thought, to both of these classes. Lands taken by agreement, whether under the present or the previous Acts, were thrown into one class with lands not taken by agreement, but under express authority; and to both the one and the other the powers contained in section 12 of the Act of 1847 were to be applicable. If this construction were not right, and the words "all or any of such lands" were confined to lands taken by agreement under the Act of 1904, then there was still more pointedly an express statutory enactment that the authority contained in section 12 of the General Act should apply to such lands. The Act of 1904 did not, except by this section, give anywhere, in so many words, power to sink wells or to collect water for the purposes of the new reservoir. Without express words, the general enactment of section 12 of the Act of 1847 would, of course, apply; but it seemed to him that these words in section 10 must have been introduced (as must also have been section 16 of the Act of 1887) in order to add to, or enlarge, the general authority which, in the absence of express enactment, would exist by the incorporation of the Act of 1847. There was there, he thought, statutory authority to sink wells in lands purchased by agreement. The construction at which he thus arrived was fortified by the fact that section 11 contained a veto upon sinking wells in lands purchased by agreement in a particular place—viz., the county of Middlesex—an enactment which was without meaning unless the Act had somewhere contained a power to do that work on lands purchased by agreement. It had been strongly urged that the present case was covered by the previous decision of the Court in the Frimley case. But, in his opinion, that case differed from the present one in two essential particulars. The first was that there were not in the Act relating to the Frimley Company any such words as were found in section 16 of the Act of 1887 and section 10 of the Act of 1904 of the Barnet Company, giving specifically, by reference, the powers contained in section 12 of the Act of 1847; and, secondly, that the Act there had not, as had the previous Acts here, given such powers as were contained in section 8 of the Act of 1883, sections 7 and 16 of the Act of 1887, and, if his construction were right, section 10 of the Act of 1904. The statutory authority contained in section 23 of the Frimley Act was to make certain defined water-works, with all proper and necessary wells, and to enter upon, take, and use such of the lands delineated on the deposited plans, and described in the book of reference, as might be required for this purpose. The water-works and pumping-stations authorized were described in detail in that section. The decision of the Court was that, under the Act, the water-works, including the wells, were a defined thing, and that the general authority contained in section 30 to purchase land by agreement was an authority to purchase not so as to increase or alter the area over which the water-works, in the sense of works for the collection of water, might be carried, but to enable the Company to acquire land for ancillary purposes. There was in this case no section equivalent to section 23 of the Frimley Act; and there was in section 10 of the Barnet Company's Act of 1904 the provision which was not in the Frimley Act. That case and the present one were both cases of construction; and the construction which the Court placed upon the Frimley Act formed no ground for a decision upon the question of the true construction of the Barnet Act. In his judgment, the Acts of the appellant Company had conferred upon them the right to execute the works and exercise the powers mentioned in, or conferred by, section 12 of the Act of 1847 upon lands within the limits of supply; and as regarded wells, they might within those limits sink a well at any place at which a well was proper and necessary in connection with the reservoir and water-works authorized by the Act—including, of course, the Arkley reservoir. It was not disputed between the parties that the particular well in question was to be sunk for the purpose of supplying the reservoir authorized by section 6 of the Act of 1904. It was within the limits of supply, and was proper and necessary for the service of the reservoir. Under these circumstances, he thought that what the Company were doing was not *ultra vires*, that the injunction which had been granted was wrong, and that the order made in the Court below ought to be discharged, and judgment entered for the defendants, with costs, including the costs of the appeal.

Lord Justice KENNEDY said he had had an opportunity of perusing and considering the judgment which had just been read, and it so completely and exactly expressed the reasoning which appeared to him to be correct, that he desired simply to express his concurrence with that judgment.

Lord Justice VAUGHAN WILLIAMS said the judgment of the Court would be that the appeal be allowed, with costs.

Mr. EUSTACE HILLS said he believed it was the intention of the Attorney-General to take the opinion of the House of Lords on this matter. He did not know whether, under these circumstances, Sir Robert Finlay would agree to his suggestion, which he thought would be most convenient to all parties, that the works should be suspended pending the decision of the House of Lords.

Considerable discussion ensued on this point.

Lord Justice VAUGHAN WILLIAMS expressed the view that if the well were sunk and drained the whole district it would do irreparable injury which could never be put right again.

Lord Justice BUCKLEY, on the other hand, pointed out that it was not digging the well, but pumping the water, which would do the damage, if any.

Sir ROBERT FINLAY stated that the well was already 60 feet deep, and it was intended to go to a depth of 150 feet. It would take about five months to sink the remaining 90 feet.

It was ultimately decided that there should be no stay with regard to sinking the well, and that if any danger were apprehended from pumping hereafter, an application might be made to the Court.

DAMAGE TO GAS-MAINS BY TRAMWAYS.

The Bristol Gas and Tramways Companies' Arbitration.

In the Court of Appeal last Tuesday, Lords Justices Buckley and Kennedy and Mr. Justice Swinfen Eady had before them an appeal by the Bristol Tramways and Carriage Company, Limited, against the decision of Mr. Justice Phillimore dismissing an appeal by them from the award of Mr. Allen C. Edwards, the Arbitrator appointed by the Board of Trade to decide a difference which had arisen between the Company and the Bristol Gas Company, as to the liability of the former to pay the extra expense incurred by the latter in doing work on their mains and services, in consequence of the existence of the tramway. The proceedings in the Lower Court were reported in the "JOURNAL" for the 4th of May last (p. 309).

In support of the appeal, Mr. Balfour Browne, K.C., and Mr. Simon, K.C. (Mr. Murphy with them), argued at considerable length, as they did in the Court below, that the works done by the Gas Company had

not interrupted the traffic, and therefore were not "such works" as entitled them to claim compensation for the extra expenditure to which they might be put in consequence of the existence of the tramway.

Sir Alfred Cripps, K.C., who, with Mr. Weatherley, appeared for the Gas Company, having been heard very briefly in support of the judgment, and Mr. Balfour Browne in reply, the appeal was dismissed with costs, though their Lordships were all of opinion that the answer of the Arbitrator to the first question—viz., that the Tramways Company were liable to pay the extra expenditure incurred, even if there were no interruption of traffic, in which he had been supported by the learned Judge in the Court below—was incorrect. They therefore made a declaration to this effect, though the question did not really arise on the present appeal, as they all agreed with the Arbitrator that here there had been an interruption of the traffic within the meaning of section 32 of the Tramways Act, 1870.

LAINDON AND DISTRICT GAS COMPANY.

Application to Remove a Shareholder's Name from the Register.

In the Chancery Division of the High Court of Justice last Thursday, Mr. Justice Swinfen Eady had before him an application to rectify the register of the Laindon and District Gaslight, Coke, and Water Company, Limited, by striking out the name of Mrs. Totty, the holder of three preference shares of £5 each.

Mr. RYLAND, who made the application, said the matter came originally before Mr. Justice Eve on a motion made in June last; but the evidence was not then ready, and his Lordship directed the motion to be put in the non-witness list. At that time, Mr. M'Swinney appeared for the Company; but he (Counsel) understood that they had not instructed anyone on the present occasion. Whether or not this was explained by the fact that a Receiver on behalf of the debenture holders had been appointed, he could not say. The ground of the motion was that the applicant was induced to apply for the shares in question by misrepresentations that the dividends were guaranteed at the rate of 5 per cent., and that the applicant, who was already a holder of ordinary shares, was entitled to an allotment of these preference shares at par, and that they were likely to go to a premium. The so-called guarantee was only that of the vendors, the Water-Works, Lighting, and Power Investment Corporation; and it did not, in fact, apply to these particular shares. Counsel then proceeded to read the affidavits of the applicant and of Mr. H. P. Davis, the Secretary of the Company, and the letters exhibited thereto; the result of which appears in his Lordship's judgment.

Justice SWINFEN EADY said this was an application by Mrs. Maria Totty, of Bournemouth, that the register of the Laindon and District Gaslight, Coke, and Water Company, Limited, might be rectified by removing therefrom her name as the holder of three preference shares in the Company, on the ground of misrepresentation of material facts. The matter was a small one as regarded the amount of money; but on the evidence it appeared clear that the applicant had been misled into applying for these shares, and that she was now entitled to be relieved from the allotment by reason of the deception practised upon her. One ground was that she applied for shares in respect of which there was a representation that the dividends were guaranteed. But it seemed that at the date of the application and allotment to her of these shares there was no guarantee whatever; and this alone would entitle her to rescission. The Company did not appear that day, though he was informed that on a former occasion they did. They, however, had put in an affidavit, from which it seemed clear that there was no guarantee at the date of the application and allotment; and it was very doubtful indeed whether there was any subsisting guarantee now, because the so-called guarantee did not appear to have been given for any valuable consideration, and the agreement which was dated June 5, 1908, was only in respect of shares subscribed for in cash "on the issue you are about to make." So that, in terms, it would only apply to shares issued after that date. Again, it was made to appear to this lady that she was entitled to an allotment of shares as being an already existing shareholder; and this, as far as he could gather from the materials before him, appeared to be untrue. On these grounds, the applicant was entitled to have her name removed from the register in respect of the three shares in question, and to an order that the Company should pay the costs of the application.

The Bankruptcy of Mr. Charles Scott-Snell.

At the London Bankruptcy Court last Tuesday, Mr. Charles Scott-Snell, of No. 25, Victoria Street, S.W., applied for his discharge. The Official Receiver reported that the receiving order was made on the 19th of July, and at the first meeting of creditors he was appointed Trustee. The actual proofs of debt lodged amounted to £6155, and there were other probable claims amounting to £4295, which brought up the total liability to £10,450. The debtor carried out engineering works in Australia for three years, and came to England in 1883. In 1889, he perfected a self-intensifying gas-lamp, and sold the invention to a Syndicate for £750 in shares and an appointment as Engineer to the Syndicate at a salary of £300 per annum. Between 1899 and 1900 dividends of 40 per cent. were paid by the Syndicate; and in December, 1900, they sold the patent to the Scott-Snell Gas-Lamp Company—the consideration being £900,000 in shares and £7000 in cash. Debtor's shareholding in the parent Syndicate entitled him to four-tenths of the purchase-money; and this he duly received. He also became a Director of the new Company, which went to allotment; but, on subscription, only 50,000 shares were taken up. This capital was quite inadequate for carrying on the business; and in 1903 the Company went into liquidation, and the debtor's shares became valueless. In 1902, before the failure of the Company, there was an attempt to float a similar Company in America; and at that time the debtor considered himself worth £50,000 on the value of his shares. The only offence reported by the Official Receiver was that the assets were not equal to 10s. in the pound; and the discharge was suspended for 2½ years.

MISCELLANEOUS NEWS.

RAWCLIFFE AND DISTRICT GAS COMPANY, LIMITED.

The Report and Accounts Not Adopted.

Only some fourteen or fifteen persons in all attended the Ordinary General Meeting of the Company which was held last Tuesday afternoon at the Cannon Street Hotel, E.C.; but these proved amply sufficient to impart an exceedingly lively tone to the proceedings, which lasted about an hour and a half, and were presided over by Mr. JOHN MACLEAN, the Chairman of the Company.

The report stated that, in presenting the Company's accounts, covering the period of fifteen months from Oct. 1, 1907, to Dec. 31, 1908, the Directors desired to point out that a proportion of the administration expenses were incurred during the initial stage, and might rightly be charged to capital. The Directors had succeeded in effecting economy in the working expenses, which were now at a minimum; and they therefore believed that the next accounts of the Company would show a profit—especially if the new mains urgently required to meet the demand could be provided. The amount of capital at the Directors' disposal had been very limited; but, notwithstanding this, they had increased the number of consumers from 103 when the works were taken over to 208 at the end of 1908. For the December quarter of 1908 there was an increase in the revenue of 17 per cent. over the corresponding quarter. For the same reason—namely, want of capital—extensions at the works had not been fully dealt with; but it was now essential that part of the Company's mains be immediately enlarged. This work would be proceeded with when the Company were able to raise the necessary capital; and thereby the revenue of the Company could be materially increased, and the works made to produce a good profit. The Directors had approached the Vendor Company [this was the Water-Works, Lighting, and Power Investment Corporation], with a view to obtaining a reduction in the purchase consideration, and hoped to shortly be able to report an arrangement to this effect. A certain section of shareholders had recently thought fit to convene an extraordinary general meeting. The Directors felt that no purpose could be served by such meeting being held, except depreciating the shareholders' property, and that it was best to await the general meeting. Such view had been confirmed; and the Directors would be pleased to have with them on the Board any shareholder representative of the section of shareholders referred to. The names of the Directors appearing on the report were: Mr. John Maclean, Chairman, Mr. H. W. L. Way, J.P., and Mr. E. Eaton.

The accounts showed that at the end of 1908 there had been issued 219 ordinary and 309 preference shares. These were all of £5 each; and the total amount paid up on them was £2639 3s.—there being 17s. outstanding. This left £7360 of capital still to be issued out of the £10,000 which was the total amount authorized. On the other side the items were: Leasehold buildings and premises, gas-works, and mains at cost as per purchase agreement, £3500; and expenditure since, £471. This made £3971, and left a debit balance on capital account of £1332, which was carried to the balance-sheet, where it appeared along with the following items: Preliminary and formation expenses—Water-Works, Lighting, and Power Investment Corporation, Limited (as per agreement), £800; suspense account for payments made on account of promotion and issue expenses, £87; stocks on hand, £11 10s.; sundry debtors for gas, meter, and stove rental and residuals, £128; cash at bank and in hand, £4 13s.; and balance of loss on revenue account to date, £50 13s.—total, £2413. On the other side, the creditors were: Water-Works, Lighting, and Power Investment Corporation, Limited—balance of purchase money, £1683 18s., and of formation expenses account, £332, less general account balance, £12 10s.—£2003 8s.; tradesmen and others for stoves, meters, fittings, coal, and general stores, £365; and rent and salaries, £45. The expenditure on revenue account was £678 11s.; while on the receipts side the items were: Sale of gas, including meter and stove rentals, £620 17s.; and residuals, £7 1s.; the balance of £50 13s. being the revenue loss to date. The accounts were signed by Mr. Maclean and Mr. Eaton. The Auditors (Messrs. F. Rowland, Smith, and Co.) appended a certificate that "subject to the remarks contained in our report to the shareholders herewith, we certify that we have obtained all the information and explanations we have required, and that in our opinion such balance-sheet is properly drawn up so as to exhibit a true and correct view of the state of the Company's affairs according to the best of our information and the explanations given to us and as shown by the books of the Company.

The CHAIRMAN having asked whether the shareholders would take the report and accounts as read,

Mr. G. W. TOWNEND, Chartered Accountant of Goole (who intimated that he represented a number of shareholders), suggested that they should hear the report which the Auditors referred to as having been made by them.

The SECRETARY (Mr. H. P. Davies) thereupon read the document, which was of a lengthy character. In the course of it, the Auditors said that, though there had been a number of share transfers, all of which were shares allotted to the vendors as part of the purchase consideration, no transfer fees seemed to have been received. They had not seen vouchers of some items—principally petty cash—but they appeared to be in order. No depreciation had been provided for the lease (which was for 21 years), mains, or buildings; and they had seen no certificate that capital expenditure shown had been expended on capital account. The purchase agreement provided that all stores on hand at the date of completion of the purchase should be taken over at a valuation; but this did not seem to have been made, and therefore the liability (if any) did not appear in the accounts. They had seen no vouchers in support of the item of £800 for preliminary expenses; and they did not know whether or not this was actually spent by the vendors. The signatories to the Memorandum and Articles of Association did not

appear to have paid for their shares; and they did not appear as shareholders on the register. They had been unable to verify the gross revenue, as for some portion of the period the receipts were entered as a lump sum. Since April 1, 1908, the vendors had held less than £50 of capital in the Company. One of the Directors—Mr. E. Eaton—did not take up his qualification until after the date of the present balance-sheet. The Secretary (dealing with the report) said the statements made called for some little explanation. The first thing pointed out was that no transfer fees had been received by the Company; but this was an optional matter. Secondly, a certificate with reference to capital expenditure could be obtained from the Works Manager at any time. Vouchers in support of the item of £800 for preliminary expenses were produced to the Auditor at the time of the statutory accounts; but they had now been mislaid. Though it was stated in the Auditors' report that less than £500 capital of the Company was held by the vendors since April, 1908, to the closing of the accounts, this was rather misleading, because the vendors agreed in April, 1908, to take shares in settlement of a sum due to them, which would bring their holding considerably over £500. As a matter of fact, however, the actual allotment did not take place until January of this year. They really had more than £700 worth of shares. Mr. Eaton was certainly appointed a Director in June, 1908, and accepted the appointment; but a fortnight or three weeks afterwards he resigned, so the qualification was not taken up. He was, however, re-appointed in July; and he then took up the necessary qualification. With reference to the shares of the signatories not being allotted, he would point out that they were still liable for the shares, and they had now been placed upon the register.

The CHAIRMAN then, without comment, moved that the report and accounts be adopted.

Mr. EATON seconded.

Mr. TOWNEND said he intended to move an amendment, and would give good reasons for doing so. In the first place, he considered the accounts most unsatisfactory; and, in the second, he would tell them what the position of the Company was to-day. He was asked, when the Company was floated, to accept the Auditorship; and he agreed, on condition that a copy of the prospectus was sent to him for approval. This was not done; but nevertheless his name was published as Auditor, and sent out broadcast to people who might wish to apply for shares. Since then, many shareholders had written to him in respect to the matter. Goole, where he resided, was 3 miles from these works; and at the time the Company was formed, he was collecting the gas-rentals for the Water Company. As soon as the prospectus was sent out, he decided to have nothing to do with the Company, and said he should not act as Auditor. At that time, he believed there were something like 60,000 prospectuses sent out all over the United Kingdom to likely applicants, offering these shares. He understood that £1500 of capital was applied for, and it cost about £800 in postage and expenses to raise this amount. First of all, it was necessary to get a list of likely applicants; and he gathered that one of Mr. Eaton's Companies supplied such a list, consisting of about 60,000 names, and charged for it at the rate of 50s. per 1000—in other words, £150. Then the postage on the prospectuses, at 1d. each, came to another £250. This year, the Directors sent out another prospectus, offering a bigger guaranteed dividend—5 per cent., instead of the 4 per cent. in the first prospectus. He understood this issue cost the Company something like £700; and applications were made for shares amounting to £1100. The money that had been spent on this concern was to his mind disgraceful. Mr. Eaton had seen the undertaking; but he did not think the other Directors had been to Rawcliffe. [The CHAIRMAN: I have been there.] Anyway, though the purchase price was £3500, there was nothing to sell except a lease for 21 years, at £50 a year. The Directors undertook to do certain things, and to make certain alterations; but this had not been done. The object of the Directors—and the only object—seemed to have been to get the purchase price—£2800 in cash, and 140 shares of £5 each fully paid. Since the Company was first formed, the sheriff had been in possession for execution in respect of claims no less than half-a-dozen times. About two months ago, he was in possession for an account of about £20; and a receiver was appointed. The execution sheriff, of course, had to withdraw; and the receiver was withdrawn also within a month. In June last year, the Directors took powers to issue £2000 of debentures in the Company; and they then proceeded to place some debentures, for the purpose, he understood, of giving the vendors a further payment on account of their purchase money. Since then more debentures had been issued—he believed, amounting to £300. Another creditor sued the Company; and immediately an execution was levied, another receiver was appointed, who happened to be Mr. Eaton's clerk, Mr. Williams.

Mr. EATON: He is not my clerk. All I wish you to do is to stick to the truth.

Mr. TOWNEND: I say he is nominally your clerk—that he has to do as you tell him.

Mr. EATON: I have never paid him any salary in my life.

Mr. TOWNEND: I say he is bound to do as you tell him. He is under your thumb and finger just as much as Mr. Davies is. Continuing, he remarked that two receivers had been appointed in two months in respect of debentures issued by the Company. The works were in a most unsatisfactory condition. The lease provided that the Company should repair; but the Company had done nothing whatever, and the retorts would not last another fortnight. The Parish Council of Rawcliffe had not been supplied with gas for nearly three weeks; the consumers were complaining; and the town had been altogether in darkness on several occasions. The Company had applied for a supply of coals to every colliery in Yorkshire without avail. He thought from one colliery they did get something like two trucks, though they had had fourteen or fifteen refusals. If they could not get coal from somewhere, the works would be closed, as they had none left. All this had irritated the consumers; and, in fact, he considered that the Directors had in every way mismanaged the Company most disgracefully. He therefore begged to move that the report and accounts be not adopted.

Mr. J. A. PAINE, in seconding the amendment, remarked that evidently a great deal of mismanagement had been going on.

Mr. EATON, in reply, said Mr. Townend (who held one single share in the Company) had given them his reason for not acting as Auditor. Happily, there was a record of what the main reason really was; and it was contained in correspondence. Mr. Townend asked for an increase in the commission of 5 per cent. which he was receiving for the collection of the rentals. He wrote to the Company and to him (Mr. Eaton) saying that the 5 per cent. for merely collecting the money from the few slot meters and the ordinary rentals did not remunerate him for the time he was devoting to the work; and therefore he asked for a further sum. He (Mr. Eaton) personally pointed out to him that the 5 per cent. amounted to something like £25 or £30 a year; and said that, while he recognized this might not cover his time, yet, in the circumstances in which the Company were then placed, he did not think the Directors would feel inclined to pay him another 1 or 2 per cent. for simply collecting the rentals, as they intended to get the administration work done in London. Thus the real reason for his declining to act as Auditor for the Company, was not as Mr. Townend had stated, but because he asked for an increase in his commission which the Directors could ill-afford. As to the complaints about the promotion expenses, he was under the impression that they had paid the "Goole Times," a journal with which Mr. Townend was largely connected, a sum that might perhaps exceed the charge of a London paper. Mr. Townend had not told them anything either about this or about his commission.

Mr. TOWNEND said he was only a shareholder in the "Goole Times," and received no commission.

Mr. EATON (continuing) remarked that Mr. Townend had gone on to state that nothing had been done to the works in pursuance of the covenants in the lease. When the works were taken over by the vendors, there was not a single retort capable of making gas. The meters were not registering, the mains were leaky, and the works were in a condition which would, he thought, have shocked Mr. Townend had he taken the trouble to visit them, which he did not believe he did all the time he was Manager. The vendors had undertaken to spend a certain amount of money on improving the works; and the first step in this direction was to lay a main down to Rawcliffe Bridge, which increased the number of consumers by 100 per cent. Consequently, it was unfair for Mr. Townend to say that nothing had been done to the works. Reference had likewise been made to the issue of debentures, the primary object of which issue was stated to be the payment to the vendors of an amount due to them. This statement was, however, incorrect. There was a minute of the resolution to issue debentures; and the Chairman made it a great point that, if they were to be issued, the proceeds should be carefully preserved for enlarging the mains, whereby the revenue could be still further increased. Mr. Townend had next referred to Mr. Williams being his (Mr. Eaton's) clerk. He had sent for Mr. Williams, and he was there; and he would ask him to state whether he was his clerk, or whether he had any control over his actions. Mr. Townend had also referred to the appointment of a receiver. They all knew that a receiver was a friend who sometimes did a great service to shareholders. The Directors found themselves short of capital, and unable to pay some of their creditors; and in order to protect the interests of the shareholders, a receiver was appointed, and thus the interests of the shareholders were protected. Mr. Townend would make them believe that, with the executions, the receivers, and so on, the Directors had been doing their best to damage the interests of shareholders when they were themselves shareholders. He failed to understand why Mr. Townend attacked the Company as he had done. He did not think, even if the statements were correct, that it would be Mr. Townend's duty to depreciate the property as he had done in that room and by means of circulars. If the Directors were guilty of all that had been alleged, he could not understand the desire to throw mud at the concern. There must be something behind it. As to the reference to the works being closed, Mr. Townend appeared to know more about the matter than the Directors did. He (Mr. Eaton) did not think it was the intention of the Board to close the works. During the whole of the time that the works were managed by Mr. Townend, who was taking £30 a year, not a single new consumer was put on. The Directors had spent £400 or £500, and had personally lent money to the Company; and they had increased the revenue by 100 per cent.

Mr. TOWNEND: My firm were not appointed Managers of this Gas Company. We simply collected the gas-rentals.

Mr. EATON: I am talking of the time before the Company came on the scene.

Mr. TOWNEND: That has nothing to do with the Company. A bigger fraud never existed than this prospectus.

Mrs. R. E. J. SCOTT: Why did Mr. Townend's name appear in print, if he was not Auditor? I have a paper with his name on. It is false representation.

Mr. EATON: He declined to act.

Mrs. SCOTT: Then you had no right to publish his name. It is an illegal thing to have done.

The SECRETARY: He was Auditor at that time.

Mr. TOWNEND denied that he had ever audited a single account. Continuing, he read a letter dated Nov. 8 from Mr. Wright, Steward to Mr. Creyke, the ground landlord, in the course of which the writer said: "Things appear to be in a hopeless state; and, so far as I can see, the only plan is for the shareholders to go into liquidation. I am afraid the Company have got such a bad reputation already, that they cannot obtain a supply of coal. The contract with the Parish Council has been broken time after time; and we are already looking for a fresh source of supply. The works are very much depreciated; and I, as agent of the owner of this property—for after all the property is only a lease—shall have something to say about the continuance of the lease before very long." He could read other letters.

Mrs. SCOTT: It is a dreadful state of things when we do not get any return on our money, and hear such a report as Mr. Townend gives.

Mr. EATON: I have no doubt the next balance-sheet will show a profit.

Mrs. SCOTT: It will not, if the town is in darkness.

Mr. EATON: It is not so.

Mr. PAINE: Where are the Water-Works, Lighting, and Power Investment Corporation, who guaranteed the interest?

In reply to further remarks,

The CHAIRMAN said: The Directors' fees are ten guineas for the whole of the fifteen months covered by the accounts. Since then there have been no Directors' fees or travelling expenses. We have done the best we could with the capital. We have put in a lot of ordinary and slot meters.

Mrs. SCOTT: What is the good of having meters if you have no gas?

The CHAIRMAN: We have laid out the money to the best of our ability; and we have no money to go on with. We shall have to re-arrange matters or go into liquidation. I believe the works could be made a paying concern. I know the consumers are anxious to get gas; and if we could obtain a little capital for new mains, we should secure additional street lighting to the extent of eighteen or twenty lamps, which would bring in about £40 a year more.

Mr. PAINE: It is a game of shuttlecock between the two Companies.

The CHAIRMAN: If you will come on the Board, I shall be pleased.

Mr. PAINE: I should be sorry to join such a disgraceful Board.

The CHAIRMAN (to Mr. Townend): What do you propose as an alternative?

Mr. TOWNEND: I have nothing to propose.

A vote was then taken, when five voted for the amendment, and seven in favour of the adoption of the report.

Mr. TOWNEND: The meeting has been packed. I warn any shareholder against voting, if he has not held his shares three months. I demand a poll, and also to know how many shares are held by those present, and who are the shareholders. The Secretary has been offering shares up and down to dummy shareholders to beat this amendment. You have been transferring shares for this meeting. The Act says: "Any shareholder holding shares for less than three months prior to the meeting cannot vote." I hold proxies, properly filled in and lodged 72 hours before the meeting, for 194 shares. The Board's proxies say 24 hours, and they are bad. There is no such thing as proxy voting at 24 hours. If, however, the Chairman will ascertain who is eligible to vote, I shall be satisfied, and will place my proxies against the Board's.

Mr. EATON: You cannot demand a poll under £3000.

Mr. TOWNEND: I ask the Chairman to allow a poll to be taken. You can use your discretion; but if you say "No," it is against the interests of the Company.

A fresh vote was then taken, after ruling out those present who had not held their shares for three months; and five then voted for the amendment, and five against it. It was suggested that the Chairman had a casting-vote; but he did not record it. Instead, he expressed his willingness that a poll should be taken. This was at once done, and resulted in 265 votes for the amendment, and 121 against.

The report and accounts were therefore not adopted.

The CHAIRMAN next proposed the re-election of the retiring Director, Mr. H. W. L. Way, J.P.

Mr. TOWNEND moved as an amendment that he be not re-elected.

Again the voting was five for the amendment, and five against.

The CHAIRMAN said the proposal would be withdrawn, as it was not the unanimous wish of the shareholders that Mr. Way should be re-appointed.

Mr. EATON: May I ask you to make a note that Mr. Townend has voted—he not having paid his calls?

The CHAIRMAN: It was stated that none of the signatories had paid for their shares; but that was passed. It was understood that they were liable to be called on, and so were counted as shareholders.

The Auditors were re-appointed on the motion of Mr. TOWNEND.

Mr. TOWNEND: The business, I take it, of the ordinary meeting is now ended; but I may say that my instructions from the shareholders I represent are that, unless the Directors are prepared to resign in a body, immediate steps will be taken to put the Company into compulsory liquidation. There are two ways of winding-up the Company. My idea would be for a fresh Board of Directors to be appointed, and then to approach the Parish Council, or some other persons, and see if they would buy the assets. If you go into liquidation, you immediately destroy the assets and break the lease. I am not for breaking the lease, if anything can be saved for the shareholders out of the wreck. I believe the Parish Council are prepared to take over the works at a price. In the alternative, the shareholders I represent intend to apply for an order for compulsory liquidation, and to have the matter thoroughly threshed out in the Courts.

The CHAIRMAN: We will take your proposal into consideration and negotiate with you with a view to the resignation of the Directors or some other arrangement being made. Failing some satisfactory arrangement, the Directors would probably be prepared to resign.

Mr. J. BAXTER CORRIE said nearly twelve months had elapsed since the date to which the present accounts were made up; and it would be interesting to know how the Company had got on since then.

The SECRETARY said the revenue figures were as follows: For the quarter to December, 1907, £111; and to December, 1908, £129. For the quarter to March, 1908, £180; and to March, 1909, £190. For the quarter to June, 1908, £75; and to June, 1909, £71. The total increase in revenue since the last balance-sheet was made out was between 5 and 6 per cent.

Mr. EATON said that if the mains were increased, they would earn another £50 or £60 a year, which would bring the Company probably on to a small dividend footing. That would be the immediate gain, without reckoning anything for the future.

Mr. CORRIE asked what was being done as to the proposal that the vendors should make a reduction in the purchase consideration.

The SECRETARY said the matter had been put before the Receiver of that Company, and also before the largest debenture holders; and the Receiver had indicated that he would certainly be prepared to reduce the £1500 or £1600 now outstanding.

Mr. EATON, in reply to a question, stated that the cost of increasing the mains as suggested would be about £250.

The CHAIRMAN (to Mr. Townend): If you will put your proposal in writing, we shall be glad to meet you.

Mr. TOWNEND: You have wrecked the concern; and you should now let the shareholders see if they can make anything out of it.

After this parting shot, Mr. Townend gathered up his papers, the Directors and other shareholders seized their hats, and a somewhat dejected little party walked down the stairs from the third-floor room of the hotel in which the meeting had been held.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 455.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 14	10	Alliance & Dublin 10 p.c.	17—18	..	5 11 1
298,955	10	,,	7	Do. 7 p.c.	12½—13	..	5 7 8
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
200,000	5	Oct. 28	6¾	Bombay, Ltd.	5⅞—6	..	5 8 4
40,000	5	,,	6¾	Do. New, £4 paid	4¾—4⅞	..	5 9 1
50,000	10	Aug. 26	15	Bourne-mouth Gas and Water	28—28½	..	5 5 3
311,810	10	,,	7		16½—16⅝	..	4 3 7
75,000	10	,,	6		15⅝—15⅞	..	3 16 2
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	254—257	..	4 17 3
300,000	,,	,,	9½	Do. New	190—192	..	4 19 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	,,	June 11	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
220,000	Stk.	Sep. 10	11	Brighton & Hove Orig.	208—213	..	5 3 3
246,320	,,	,,	8	Do. A Ord. Stk.	150—152	..	5 5 3
462,000	23	Oct. 14	10	British	42—43	..	4 13 0
109,000	Stk.	Aug. 26	6	Bromley, A 5 p.c.	118—120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	88—90	..	5 0 0
82,278	,,	,,	5½	Do. C 5 p.c.	106—108	..	5 1 10
54,000	,,	June 25	3½	Do. 3½ p.c. Deb.	88—90	..	3 17 9
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	13½—14	..	5 0 0
250,000	Stk.	June 25	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
103,000	10	—	—	Cape Town & Dis., Ltd.	4—5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛—5⅜	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	47½—48½	..	6 3 9
100,000	Stk.	June 25	4½	Do. 4½ p.c. Deb. Stk.	82—84	..	5 7 2
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	108½—110½	+½	4 10 6
1,491,280	Stk.	Aug. 26	5⅝	Commercial 4 p.c. Stk.	109—111	..	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do.	104—106	..	4 14 4
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800 000	Stk.	,,	5	Continental Union, Ltd.	97—99	..	5 1 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—140	..	5 0 0
492,270	Stk.	—	5	Derby Con. Stk.	121—123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
143,995	,,	Oct. 2	5	East Hull 5 p.c. Ord.	97—99	..	5 1 0
486,093	10	July 14	12	European, Ltd.	24½—25	..	4 16 0
354,060	10	,,	12	Do. £7 10s. paid.	18½—19	..	4 14 0
15,141,545	Stk.	Aug. 12	4⅝	Gas light and Coke	4 p.c. Ord.	102—104	..	4 9 8
2,630,000	,,	,,	3⅝		3½ p.c. max.	87—89	−1	3 18 8
3,793,735	,,	,,	4		4 p.c. Con. Pref.	103—105	−½	3 16 2
4,193,975	,,	June 11	3		3 p.c. Con. Deb.	82—84	−1	3 11 5
258,740	Stk.	Sep. 10	5	Hastings & St. L. 3½ p.c.		92—94	..	5 6 4
82,530	,,	,,	6½	Do. do. 5 p.c.		117—119	..	5 9 3
70,000	10	Sep. 29	11	Hongkong & China, Ltd.		17⅞—17⅞	..	6 4 0
131,000	Stk.	Sep. 10	6½	Ilford A and C		144—146	+6	4 9 0
65,783	,,	,,	5	Do. B		108—110	+3	4 10 11
65,500	,,	June 25	4	Do. 4 p.c. Deb.		102—104	..	3 16 11
4,940,000	Stk.	Nov. 11	8	Imperial Continental		176—178*	..	4 9 11
1,335,030	Stk.	Aug 12	3½	Do. 3½ p.c. Deb. Red.		95—97	..	3 12 2

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c.	119—121	..	4 19 2
561,000	Stk.	,,	10	Liverpool United A	223—225	..	4 8 11
718,100	,,	,,	7	Do. B	166—168	..	4 3 4
306,083	,,	June 25	4	Do. Deb. Stk.	104—106	..	3 15 6
75,000	5	June 11	6	Malta & Mediterranean	4⅞—5⅛	..	5 17 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	99—102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12½—13*	..	5 7 8
1,775,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con	106—108	..	4 3 4
518,795	Stk.	June 25	3½	Do. 3½ p.c. Deb.	93—94	..	3 14 6
55,940	10	Aug. 26	7	North Middlesex 7 p.c.	13—13½	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	140—142	+1	5 12 8
60,000	5	Sep. 10	8	Ottoman, Ltd.	6⅛—6⅜	..	6 5 6
31,800	53	Aug. 26	13	Portsea Island A.	137—139	..	4 19 0
60,000	50	,,	13	Do. B.	129—131	..	4 19 3
100,000	50	,,	12	Do. C.	120—123	..	4 17 7
114,800	50	,,	10	Do. D and E.	101—103	..	4 17 1
398,490	5	Oct. 28	7	Primitiva Ord.	7—7½	+⅛	4 16 7
796,980	5	July 29	5	Do. 5 p.c Pref.	5⅛—5⅜	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
1,000,000	10	Oct. 14	8	River Plate Ord.	16⅜—16⅝	..	4 15 7
312,650	Stk.	June 25	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
250,000	10	Sep. 29	8	San Paulo, Ltd.	14⅜—14⅝	..	5 8 6
62,500	10	,,	6	Do. 6 p.c. Pref.	11⅞—12⅛	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	51—52	..	4 16 2
135,000	Stk.	Sep. 10	10	Sheffield A	230—232	..	4 6 2
209,984	,,	,,	10	Do. B	230—232	..	4 6 2
523,500	,,	,,	10	Do. C	230—232	..	4 6 2
70,000	10	Oct. 14	10	South African	12⅜—12⅝	..	7 16 11
6,429,895	Stk.	Aug. 12	5⅛	South Met., 4 p.c. Ord.	120—122	..	4 7 4
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	82—84	−1	3 11 5
209,820	Stk.	Aug. 26	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Aug. 12	5⅛	S'th Suburb'n Ord. 5 p.c.	119—121	..	4 10 11
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	172—124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord.	109—111*	+½	4 10 1
120,000	Stk.	Aug. 12	6⅞	Tottenham A 5 p.c.	133—135	..	5 1 9
453,940	,,	,,	5⅜	and B 3½ p.c.	111—113	..	4 15 3
149,470	,,	June 25	4	Edmonton 4 p.c. Deb.	100—102	..	3 18 5
182,380	10	June 11	8	Tuscan, Ltd.	9—9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	101—102	+1	4 18 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.	110—112	+1	4 9 3
255,636	Stk.	Aug. 26	6⅜	Wands-worth B 3½ p.c.	139—141	..	4 14 0
79,416	,,	June 25	3	3p.c. Deb. Stk.	73—75	..	4 0 0
835,872	,,	Aug 12	5⅜	West Ham 5 p.c. Ord.	123—125	..	4 6 0
210,000	,,	,,	5	Do. 5 p.c. Pref.	126—128	−1	3 18 2
253,300	,,	June 25	4	Do. 4 p.c. Deb Stk.	108—110	−4	3 12 9

Prices marked * are "Ex div."

PUBLIC LIGHTING OF COBHAM.

The Oil v. Gas Controversy.

At the close of the reference to this subject in the last number of the "JOURNAL" (p. 423), it was mentioned that the Gas Company had hired the Village Hall for a meeting at which their side of the public lighting question could be put forward. It was held on Monday last week, and was attended by a large number of parishioners.

At the outset, the Secretary of the Company (Mr. E. Saphin) stated that he had written to every member of the Parish Council, and one was with them. He then went on to say that the Company had never had a full opportunity of bargaining with the Council. He attended two meetings in October and November, 1908, and at these they got on very well indeed. Afterwards a draft agreement was submitted to the Council which specified that the Company were to light the lamps on stipulated conditions for certain hours, and if they did not light them, they were to be subjected to a penalty of 6d. per night for each lamp that failed, after due notice had been given at the works. With this draft in his hands, the Chairman of the Parish Council wrote asking what the Company would supply gas for "at per week per standard." He (Mr. Saphin) replied that the charge would be 2s. 2d. per lamp per week; and in view of this fact, he maintained that the Company were not fairly represented when it was said that the Parish Council could get no terms for future years. On the 23rd of August last, the agreement was returned to him with so many alterations that, if signed in that form, litigation would have resulted over every clause. He took it to the Company's Solicitor to be put into shape. It was sent to the Epsom Rural District Council, and the next thing he heard was that Cobham was to be lighted with oil-lamps. In all the correspondence, he challenged anyone connected with the Parish Council or the Rural District Council to produce one letter that had asked him to reduce one penny. As to the period of the agreement, the Council wanted two, three, or five years; and then the Company's Solicitor said if they wanted a long agreement ask them to have seven years. It was only a draft agreement, and the Council could have altered the term; and as to the price, they could have asked for a rebate in the event of a reduction being made to the public. Mr. Saphin then turned his attention to some of the criticisms passed on the Gas Company at the previous meeting, and said it was most unfair and cowardly to attack them when they could not answer for themselves.

Mr. Harvey Lee moved a resolution expressing satisfaction with the Company's explanation, and requesting the Epsom Rural District Council not to approve the scheme of making use of oil-lamps for lighting the parish. He said as an old parishioner he wanted fair play; and they were going to have it. If they were only going to have oil-lamps for six months, let them go without light until they could get gas. Mr. S. A. Child, a member of the Parish Council, said he was not going to move any amendment, as he thought the matter had been pretty well thrashed out before. He had read all the correspondence, and it was utterly inconsistent with the statement made by the Secretary of the Gas Company that evening. Mr. T. Hale spoke in praise of the Company. The Chairman (Mr. C. A. Smith) pointed out that the Parish Council had £100 in hand for the purpose of lighting the parish. He said it did not matter if gas cost £10 more than oil; what the parish wanted was the best form of illuminant for public lighting—gas.

The resolution was then put to the meeting. Many abstained from voting; but there were only two hands held up against the resolution, which the Chairman declared carried practically unanimously.

ORIENTAL GAS COMPANY, LIMITED.

The Public Lighting Contract.

In the report for the year ended the 30th of June last, which the Directors of the Company will submit to the proprietors to-morrow, they say the prices of coal which ruled during the twelve months were somewhat easier, but the markets for coke and other residuals were unfavourable; so that the net result is not so good as it has hitherto been. At the last two meetings, allusion was made to the Corporation's request for tenders for the future lighting of the city of Calcutta. More than one tender was submitted by the Company to meet the varying views of the Corporation; and ultimately, in the spring of this year, negotiations were carried on by the Board in London with Mr. Alfred Mansfield, the accredited technical adviser of the Corporation. After several protracted interviews, terms for a new contract for the supply of gas to the public lamps from May 1, 1911, were agreed upon, and were finally accepted by the Corporation on the 8th of September, subject to the sanction of the local (Bengal) Government. Under the new contract (which is to be for a period of twenty years), an improved supply of gas will be furnished to the city at increased pressures. This will necessitate a very large outlay by the Company for new mains and plant and for alterations, and also an augmentation of the staff. These matters have already been taken in hand. Several new mains have been laid since the 30th of June, and a Chief Distributing Engineer and an Assistant—both thoroughly qualified and experienced—have been dispatched to Calcutta. The question of lighting and extinguishing, cleaning, and maintaining the lamps and their accessories, and the supply of new lamps and mantles, is left open for further consideration and negotiations prior to the commencement of the new contract. The Directors propose, when the new public lighting contract has obtained the sanction of the local (Bengal) Government, and has been legally executed, to reduce the price of gas to private consumers; and it is anticipated that with a lower price and increased pressures a considerable advance in the use of gas will follow. The Directors recommend the payment of the usual dividend of 4¼ per cent., free of income-tax, making a total of 8 per cent. for the year.

The Steamless Radiator.

THE unique construction of Davis's Patent Steamless Radiator (Patent No. 21,453) affords UNIFORM HEAT DISTRIBUTION without Steam and Water—and their attendant drawbacks.

There is NO FLAME CONTACT under any circumstances, and CONDENSATION AND DEPOSIT CANNOT TAKE PLACE.

Davis's "Steamless" represents the acme of SIMPLICITY in Radiator construction; no Water Receptacles to fill; no Gauge Glasses to break; no Valves; no array of Cleaning Brushes; no voluminous Instruction Charts.

The Davis Gas Stove Co., Ltd., Luton.

EFFECTS OF THE MINES (EIGHT HOURS) ACT.

In the House of Lords, last Tuesday, Lord Newton asked the Government whether they could state what decrease in the output of coal had occurred since the Mines (Eight Hours) Act came into operation, and whether the Government still contemplated introducing an Amending Bill this session. He said, so far as his own information went, he believed there was no great difference in the Yorkshire collieries; but as regarded Lancashire, part of the Midlands, and South Wales, there was a reduction in the output of 10 per cent. He was further informed that the miners earned 9d. or 10d. a day less than before the Bill was passed. The Act, which was intended to be so beneficial, had, as a matter of fact, proved so unpopular that when a member of the Government (Mr. Herbert Samuel) had to seek re-election in Cleveland he had, in order to retain possession of his seat, to promise an Amending Bill. Earl Beauchamp replied that returns would not be made up till the end of the year, and there would be nothing to show the distinction between the output of coal in the six months before and the six months after the passing of the Act. The Inspectors of Mines were consulted, and there appeared to have been a small decrease in the output of coal since July 1. They pointed out that, in addition to the reduction of hours, there were other causes tending to decreasing the output. In particular, the general depression in trade had influenced many industries, and there had also been strikes and difficulties with the men. The Amending Bill was only intended to deal with a very small question—viz., whether the men should go to work early on Saturday morning, so as to obtain full advantage of the Saturday half holiday. The Government did not propose to introduce an Amending Bill other than the one already brought in.

The Engineering Supplement to "The Times" on Wednesday last contained the following remarks: "A correspondent informs us that, in consequence of the efforts that are being made by colliery managers to maintain their output in face of the restrictive influence exercised by the Mines (Eight Hours) Act, there is a tendency to hurry and carelessness in the filling of the trams; the result being deterioration in the quality of the coal raised. He suggests that colliery managers would be wise if they took steps to check this carelessness before it has led to loss of business, and that possibly it may be found less troublesome to erect additional cleaning and washing plant at the pit-head than to reduce the output of the mine and, as a direct consequence, the earnings of the individual miner."

According to the "Daily Mail," the Linby Colliery Company have posted notices to the effect that their pits will close down in a fortnight's time. The announcement has occasioned something like consternation, as some 300 miners will be thrown out of work at a time when their services should be fully occupied in coping with the increased demand for coal for the winter. The pits are situated near Nottingham; and the proprietors contend that the step, which has been taken most reluctantly, is entirely due to the operation of the Mines (Eight Hours) Act, which makes it impossible to work the colliery except at a loss.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The meeting of the Eastern District of the Scottish Junior Gas Association in Dunfermline this afternoon was, in point of numbers, one of the best they have ever had. It was a novel meeting, in respect that the larger part of the information conveyed by Mr. R. B. Chalmers, of Alva, was contained in sketches upon the blackboard, made on the spot, and immediately rubbed out to make room for others. But by this means the subjects dealt with were made much more clear than they could have been by word description. Mr. Chalmers' methods of working are very ingenious; and whether anyone may adopt them or not, there was conveyed by the discourse a sense of the value of self-reliance and resource which should not fail to be of great service to the hearers. The intimation that a circulating library is about to be opened should be of much assistance to the Association in attracting members. I should not omit to mention that the visit to the Dunfermline Gas-Works, before the meeting, was worth more than the trouble. Mr. A. Waddell, the Engineer, being an adept at thinking out for himself the kind of apparatus which will suit him, the works contain many novelties, all of which are fully answering the purposes for which they have been devised and constructed.

The accounts of the gas undertaking of the Corporation of Kilmarnock for the year ending May 15 last have been approved by the Town Council and issued. They show a total make of gas of 164,317,200 cubic feet, which was a decrease of 5½ million cubic feet upon the preceding year. Gas accounted for amounted to 152,393,500 cubic feet—a decrease of 5,208,200 cubic feet. Unaccounted-for gas amounted to 11,923,691 cubic feet, which was a less quantity than in the previous year by 256,609 cubic feet. The yield of gas per ton of coal was 9566 cubic feet—a decrease of 34 cubic feet. The total revenue for the year was £25,268, of which £17,913 (a decrease of £1894) was derived from the sale of gas, £1922 from the sale of char, and £2773 from tar and sulphate of ammonia; the revenue from residuals being £4695—a decrease of £782. The rental of gas stoves and fires hired amounted to £221. The total expenditure was £22,391, which left a balance to the net revenue account of £2877. Coal cost £9447, lime £394, retorts £363, maintenance of works £1272, and salaries and wages in the manufacturing department £5611. The total charge for the manufacture of gas was £17,127, which was at the rate of 19s. 11·28d. per ton of coal, and 2s. 1·01d. per 1000 cubic feet of gas. Distribution of gas cost £2097, which was at the rate of 2s. 5·28d. per ton of coal, and 3·06d. per 1000 cubic feet of gas. Rents, rates, taxes, and insurances amounted to £1414, which was at the rate of 1s. 7·75d. per ton of coal, and of 2·06d. per 1000 cubic feet of gas. There was a capital expenditure during the year of £5683—raising the capital account to £100,645. The capital expenditure consisted of £3300 upon buildings, machinery, &c., £615 upon main and service pipes, £1198 upon meters, and £570 upon cooking and heating appliances. Interest on loans amounted to £2168; and there is at the credit of the sinking fund £2084.

The Outstanding Virtue

Of our Wide-Fire Principle is this—

The "SALON."

Fire width - **21 ins.**

It affords a ***maximum width*** *from which Radiation takes place.*

No attempt to concentrate radiation within a narrow limit can replace this.

* * * *

The Gas-Fires of the Future will all radiate from as wide an area as Coal-Fires.

* * * *

THIS WIDE-FIRE SPACE PRINCIPLE of OURS is what the Gas Industry was waiting for.

* * * *

HAVE YOU SEEN THE "SALON"?

Its Fire-Space is 21-inches wide.

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

214.

In the Hamilton Town Council on Tuesday, the Gas Committee reported that the Gas Manager, having experienced considerable difficulty in moving waggons from the railway siding to the tipping apparatus, had suggested that plant should be provided for the haulage of the waggons. Estimates for such plant had been received from three firms, the lowest of which was by Messrs. Mackenzie and Torrance, of Edinburgh, who offered to fit up, for the sum of £95, one of Liddle's patent concentric electric capstans, of 18 H.P., capable of drawing two 25-ton waggons on a gradient of 1 in 40, at about 90 feet per minute. This offer was accepted. Bailie Cassells said a great grievance seemed to exist among users of prepayment meters; and he asked if the Gas Committee had considered the advisability of lessening the present charge. Ex-Provost Keith thought the matter might be remitted to the Committee, with a recommendation from the Council to reconsider the present charge, with a view to a reduction. Bailie Anderson, the new Convener of the Gas Committee, said it was his intention, independently of the matter being raised in the Council, to bring it before the Committee.

In the Police Court at Kirkintilloch on Tuesday, William Bain, a butcher, of Cowgate, was summoned on a charge of having caused annoyance to a neighbour by using a mincing-machine driven by a gas-engine. He denied the charge. The complainer stated that the engine and mincer were placed in a shed which stood against the gable of her house, and that the vibration caused by them affected her house so much that the gas-mantle was broken, and pieces of cement and plaster fell off, while the dropping of soot down the chimney prevented her using her kitchen range. For the defence, it was stated that the mincer was a patent "silent" one, similar to many in use in Glasgow, and that no gas-engine could be got which did not make a noise to some extent. It was argued, on behalf of the respondent, that a noise or vibration, before it could be held to be a nuisance, must be unnatural, unusual, or extraordinary, and must cause material injury to another. To put a stop to the working of this engine would be a serious interference with the accused's business, and would place him at a disadvantage compared with others in the trade. The case was adjourned to give the accused an opportunity of conferring with his landlord as to the removal of the machine to another part of the premises, and also that the Magistrate might hear and see it working.

The Dunfermline Town Council on Monday engaged in the work of adjusting Committees. In the course of the proceedings, Mr. T. Stewart, the Convener of the Gas Committee, said it was proposed by the Magistrates to appoint Mr. Bowie to the Gas Committee; and he asked the reason for this. Provost Husband said that the Magistrates noticed that Mr. Bowie had been criticizing the Committee; and he remembered the saying of a former Magistrate, to the effect that when a man found fault with a Committee they should put him on it. Mr. Stewart thought it was a mistake to put a man on a Committee who had prejudged anything to the extent Mr. Bowie had done. The officials, particularly the Manager and himself, insisted that the charges which Mr. Bowie had made should be investigated. The inference was that things were going on at the gas-works which should not go on, and there must be an inquiry. Bailie Norval, as one who had the utmost faith in the Manager, thought that Mr. Bowie should go on the Committee. The gas-works would stand the closest inspection that could be made; and after a little experience, Mr. Bowie might modify his views as to the Manager. The appointment was agreed to.

The Gas Committee of the Arbroath Town Council reported on Friday that, in consequence of an application from Messrs. Douglas Fraser and Sons, Limited, engineers, for a special rate for gas for case-hardening and other heating purposes, the Manager had submitted a statement of the larger customers, consuming over 250,000 cubic feet of gas per annum. Six of these took over 500,000 cubic feet, and four of the six consumed over a million cubic feet per annum—one consumer having used 1,475,000 cubic feet during the past year. The Manager submitted a table showing the effect of making a special rebate to consumers of 250,000 cubic feet per annum and upwards, graduated from 250,000 up to 1,500,000 cubic feet, from which it could be inferred that it might prove profitable for the gas-works if these large consumers were given a special rebate in proportion to the consumption of each. The Gas Committee remitted it to a Sub-Committee for consideration and report. The Manager suggested to the Committee the desirability of developing the sale of gas further by pushing the use of it for domestic heating. He pointed out that cooking by gas was almost universal in Arbroath; there being now 4150 cookers, grillers, and boiling-rings fixed. Gas-fires were at present supplied, as well as water-heaters for baths and other domestic purposes, and all apparatus manufactured for the purpose of utilizing coal gas for heating, at the net cost price to the Corporation—this being at a considerable reduction from list prices. The Corporation were also fixing the necessary piping for gas-fires for heating sitting-rooms and bedrooms free of charge; and the Manager suggested for consideration whether gas-fires should not also be hired or provided free. It appeared to the Committee that it would not be profitable to supply gas-fires free of charge, unless on condition of being guaranteed the consumption of a certain quantity of gas; but in the end they remitted the whole matter to a Sub-Committee to consider and report. The Town Council approved of the action of the Committee.

Sheffield and the Handsworth Water Supply.—At a recent special meeting of the Handsworth Urban District Council, a resolution was passed to dispose of their water-works to the Sheffield Corporation, and hand over to them the entire responsibility for the supply of the district.

Successful Water Divining.—Owing to the shortage of water on the property of Sir W. Clayton, Bart., at Widmere Farm, near Marlow, a water-finding expert was engaged to prospect. He stated that a good spring would be found at a depth of 90 feet; and on an artesian well being sunk at the spot indicated a spring was tapped at 96 feet which yields 8000 gallons of water per day. Several other borings to the depth of from 300 to 400 feet have been made in the neighbourhood, but with no result.

The Growth of the Demand!

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The Demand is Still Growing!

The Demand in 1903-4

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The Demand in 1908-9

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 13.

Sulphate of Ammonia.

There is practically no change to report in the market this week, either as regards tone or value. Buying has again been just about enough to take up the present output as it becomes ready, and it has mainly been for covering sales made some time ago. The quotations remain £11 2s. 6d. per ton f.o.b. Hull, £11 3s. 9d. per ton f.o.b. Liverpool, and £11 5s. per ton f.o.b. Leith. For forward delivery, the position also continues unaltered; and although little new business has transpired, it is understood that offers are still being made by dealers for January-June, 1910, shipment at to-day's price.

Nitrate of Soda.

This article remains a dull market; but quotations are still given as 9l. 3d. per cwt. for ordinary and 9s. 6d. for refined qualities respectively.

LONDON, *Nov.* 15.

Tar Products.

The markets for tar products have not been very brisk during the past week. Pitch has been steady, but dealers are inclined to take lower prices for forward delivery. Creosote is quiet, and no transactions of note are reported. In 90 per cent. benzol, there has been little business done for this year's delivery; but the transactions are not affecting the prices.

The average values during the week were: Tar, 13s. to 17s., *ex* works. Pitch, London, 26s. to 26s. 3d.; east coast, 25s. 6d. to 26s.; west coast, 24s. 6d. to 25s. 6d. f.a.s. Mersey ports, 25s. f.o.b. other ports. Benzol, 90 per cent., casks included, London, 6⅝d. to 6⅞d.; North, 5⅞d. to 6d.; 50-90 per cent., casks included, London, 7⅛d.; North, 6⅞d. to 7d. Toluol, casks included, London, 9d. to 9⅛d.; North, 9d. Crude naphtha, in bulk, London, 3⅝d. to 3¾d.; North, 3⅜d. to 3½d.; solvent naphtha, casks included, London, 1s. to 1s. c⅛d.; North, 11¼d. to 11½d.; heavy naphtha, casks included, London, 10½d. to 11½d.; North, 10d. to 10¼d. Creosote, in bulk, London, 2⅛d. to 2⅝d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast, 10⅜d. to 10⅝d.; west coast, 10⅛d. to 11d. Refined naphthalene, £4 10s. to £8 10s.; salts, 37s. 6d. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1¼d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is still very quiet, and buyers who come into the market expect to get on at even under the prices which are being quoted. Beckton to-day quote £11 5s. and £11 8s. 9d. for forward. In Hull, the figure is £10 18s. 9d.; and in Liverpool, £11 to £11 1s. 3d. In Leith, £11 5s. is quoted; and for forward, £11 7s. 6d.

*** We regret that a mistake was made in quoting the maximum price of tar and heavy naphtha in the North last week. The former should have been 17s., and the latter 10d. to 10¼d.

COAL TRADE REPORTS.

Northern Coal Trade.

There has been a rather better request for coals; and, with a fuller supply of steamers, the shipments have been heavier, more especially of gas coals. In the steam coal trade, the demand is still rather limited, and the prices fell off, with a partial recovery—about 10s. 3d. to 10s. 6d. per ton f.o.b. being now quoted for best Northumbrians. For second-class steams, from 8s. 9d. to 9s. is quoted; and for steam smalls from 5s. to 6s.—the latter class being rather more scarce. In the gas coal trade, the demand is very near its fullest; and the deliveries on the long contracts are now very heavy both for home use and for export. Durham gas coals are from 10s. to 10s. 10½d. per ton f.o.b., according to quality, for the usual classes; while for best "Wear specials," up to 11s. 6d. per ton f.o.b. is quoted. There are sales being made forward of best gas coals at about 17s. 7d. per ton at Genoa, and second-class gas coals at about 10d. per ton or so less. Some of the collieries, however, refrain from further forward sales at present. There is still a little uncertainty as to the methods of coming into operation of the Eight Hours Act at the end of the year; and the negotiations between coalowners and miners proceed very slowly. Coke is firm. Gas coke is plentiful, and is quoted at about 12s. 6d. to 12s. 9d. per ton f.o.b.

Scotch Coal Trade.

Trade is sluggish, and with no appearance of improvement. The shipping demand is again slack. For home consumption, steam coal is in poor request, and small sorts are very plentiful. The prices now quoted are: Ell 9s. 3d. to 10s. 6d. per ton f.o.b. Glasgow, splint 10s. to 10s. 3d., and steam 9s. to 9s. 3d. The shipments for the week amounted to 322,018 tons—an increase of 26,163 tons upon the previous week, and of 3177 tons upon the corresponding week of last year. For the year to date, the total shipments have been 13,109,925 tons—an increase of 597,418 tons upon the corresponding period.

Reduced Price of Gas at Seaford.—At the meeting of the Seaford Urban District Council on Monday last week, the General Purposes Committee reported that a letter had been received from the Seaford Gas Company with reference to the price of gas, suggesting that if the standard price were reduced the net charge should be 3s. 8½d. per 1000 cubic feet. It was recommended that the offer be accepted, and that seven of the lamps on the Parade be not lighted during the ensuing winter months, as suggested at the interview between the Directors and the Sub-Committee. On the motion for the adoption of the report, Mr. Hooper said Mr. Kent and he met two Directors of the Gas Company with regard to the suggested reduction in the price of gas to the Council *pro rata* with the concession made to the general consumers, and they proposed a reduction to the Council from 3s. 10d. to 3s. 8½d. The reduction to outside consumers would be very satisfactory. He thought the Company deserved the best thanks of the town. The report was adopted.

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CARRON, STIRLINGSHIRE.

GRAND PRIX,
Franco-British Exhibition.

Conviction for Illegally Tapping a Gas-Main.

A man named Peter Taylor was charged at the Salford Police Court last Friday with stealing gas from the Corporation. It was stated by the Deputy Town Clerk (Mr. J. W. Jackson) that the defendant in 1903, being in arrears, had his gas supply cut off. Recently a Corporation official found, on examining Taylor's house in Griswell Street, that a service-pipe had been fixed to the main, and connected with that supplying the house. The opinion was expressed that for at least twelve months Taylor had been obtaining gas in this way without payment. The defending solicitor admitted the guilt of his client, but said the gas had only been occasionally used since the illegal connection was made. Taylor, who expressed sorrow for what he had done, said he was a widower with two ailing children, and only earned 25s. a week. He was fined 40s. and costs.

Damage Done by Smoke.

The new Chairman of the Manchester Section of the Society of Chemical Industry (Mr. R. H. Clayton) chose for his Inaugural Address last Friday night the subject of "The Conservation of Finished Products;" and the greater part of it was devoted to the consideration of the great enemy of finished textile products—smoke. He showed in a striking way how vast is the damage done by smoke, and suggested means for combating its ill-effect. As an illustration of the losses sustained by traders in consequence of smoke, he said that a foggy week in December, 1904, cost a firm of drapers in Manchester £600 in depreciation of goods alone, to say nothing of the extra cost of lighting, cleaning, and so forth. Furnishing firms had sent him details regarding the deterioration of wood and metal work due to Manchester's atmospheric impurities; while builders and architects had suffered losses. An estimate of the loss to the nation due to coal smoke was between £30,000,000 to £40,000,000. As a solution of the domestic smoke problem, Mr. Clayton advocated the prohibition of open grates burning soft coal and the extension of heating by gas and coke. But he thought it was necessary for the community to set to work in a serious manner to clear away the difficulty, and not to imagine that simply by legislating against the factory chimney they were going to attain the necessary end.

Additional Capital for the Mitcham and Wimbledon Gas Company.—From an announcement which appears in another part of the "JOURNAL," it will be seen that the Directors of the Mitcham and Wimbledon Gas Company are inviting tenders for an issue of £12,000 of consolidated ordinary stock at a minimum price of £108 per £100. The development of the Company's business has for many years been continuous and rapid; the sales of gas having more than doubled since 1902. The dividend for the half year to June last was at the rate of 5¼ per cent. per annum; and at the minimum price offered, the stock would yield £4 17s. 2d. per cent. to the purchaser.

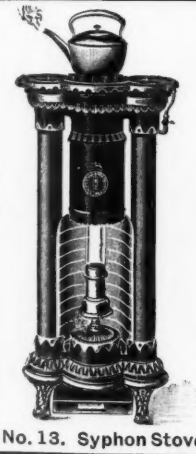
Salford Corporation Finances.

On his election as Mayor of Salford for the current year, Alderman Snape, referring to the rates of the borough, said they were almost too heavy for the ratepayers to bear. The outlook was not promising; and all he dared to hope for was that they would not be compelled to raise the rates next year. The profits of their trading departments were decreasing monthly, and were likely to be much less than the estimates; and if they were to end the year without a debit balance, it would be absolutely necessary for each Committee to exercise most rigid economy, and be determined to keep within the estimates. He also thought it his duty to warn the Council that if the members insisted on reducing the price of gas and electricity, and continued to make concessions on tramway fares, they must have increased rates. They could not have it both in "meal and in malt." The price of gas had been reduced from 3s. 1d. in 1881 to 2s. 3d. to-day. As to the relations between the Corporation and some neighbouring authorities who were supplied with gas and electricity, the newly-elected Mayor expressed the hope that any difficulties would be removed through the exercise of mutual forbearance and friendliness.

Crewkerne Lighting Dispute Settled.

After the streets had been in darkness for several weeks, the dispute between the Crewkerne District Council and the Gas Company in regard to the amount to be paid for public lighting, to which reference was made in the "JOURNAL" for the 26th ult. (p. 272), has been settled. When the Council met last Wednesday, a letter was read from Mr. A. H. Hussey, a local Magistrate and member of the Somerset County Council, complaining of the inactivity of the Council in the matter, and threatening to place it before a higher authority unless they took immediate steps to light the town. Dr. T. B. Macdermot, a member of the Council, asked what was the actual sum in dispute; and the Chairman (Mr. H. Gould) replied that it was between £10 and £11. Dr. Macdermot asked if the Council would allow him or some other private individual to pay the amount, so as to have the town lighted at once. If the Council would accept it, he would be pleased to pay the amount that night, so that the question might be settled for this winter. Such a condition of things as that then existing was, he said, a disgrace to the town. The Chairman thought this was a very handsome offer, and said he did not see how the Council could refuse it. Other members, however, considered it undesirable that a private gentleman should pay the expenses of public lighting; and, after some discussion, it was decided that the Council should pay the sum in dispute, the exact amount of which was £10 15s. 8d., and have the town lighted at once.

The annual report of the Bacup Borough Accountant shows that the total outlay on the water scheme is £251,799, and that the loans raised amount to £245,158.



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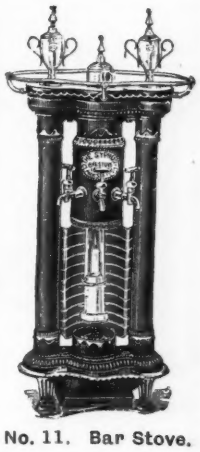

No. 11. Bar Stove.

Wages Question at the Rochdale Gas-Works.—The application of the meter inspectors, stokers, and labourers employed at the Rochdale Gas-Works for an advance of wages was before the Gas Committee last Wednesday. The Works Sub-Committee's report on the matter was considered and referred back. Information obtained from some forty towns similar to Rochdale, as to the wages paid in the gas-works, was submitted; and it showed that in only eight places is the pay for the labourers more than at Rochdale, that a large number pay the same rate, and that a few pay less.

Management of the Colwyn Bay Gas-Works.—The Lighting Committee reported at the last meeting of the Colwyn Bay Urban District Council that they had considered carefully the report on the gas undertaking by Messrs. Thomas Newbigging and Son, portions of which were given in the "JOURNAL" for the 2nd inst. (p. 340), and the reply thereto of the Gas Manager (Mr. J. W. C. Pennington), a summary of which was published at the same time. They said they felt that the Manager had not given "that attention to his duties so necessary to the good working of the concern;" and they recommended "that his salary be reduced at the rate of £50 per annum for the next six months—the matter to be then reconsidered." Mr. Bevan said the conclusion of the Committee was unjust. They had not had any direct evidence of neglect on the part of the Manager. In the course of further discussion, it was pointed out by Mr. Dicken that the Committee, in stating that they would consider the matter again in six months, did not necessarily mean that the salary would be restored to its former figure. That was far from the intention. By that time, it was assumed that the Committee who were considering the duties and salaries of the officials would probably have presented their report. The resolution to confirm the Committee's action was unanimously approved.

Exmouth Water Supply.—The opponents of the much-discussed scheme for augmenting the water supply of Exmouth are displaying the same activity as they did last year, when they succeeded in defeating, on a poll of the ratepayers, the decision of the District Council to apply for parliamentary powers. At the last meeting of the Council, a further discussion of the subject was raised on a motion by the Rev. O. J. Reichel for rescinding the resolution passed in September, instructing the Clerk to take the necessary steps to promote a Bill in the ensuing session. Mr. Reichel asserted that two-thirds of the ratepayers were opposed to the Dottor scheme, which Mr. Randell, who seconded the motion, characterized as the maddest and wildest scheme they had seen. The proposal to rescind the previous resolution was defeated. Mr. Randell then called attention to certain sections in previous Exmouth Water Acts, giving power to take water; and he proposed that a Committee should be appointed to look into the conditions of the intakes and report on the subject. The Clerk expressed the opinion that the various Water Acts had been repealed by the last Act, which was passed in 1900; but it was pointed out that this measure reserved to the Council the right to utilize any water not taken under the former Acts. The resolution was carried, and a Committee appointed to give effect to it.

Cost of Lighting in Ireland.—At the close of an article on "Long Nights and Bright Lights" in last Wednesday's "Irish Independent," the author (Mr. A. T. Oliver) said: "Since the seventies, the competition evoked by the introduction of electric lighting has been of real service to gas producers and consumers. With equal experience of electric light and gas, as a domestic illuminant, the writer awards the palm for brilliancy and economy to the inverted incandescent gas-mantle, which yields an ideal light at a cost of 1d. for five hours. Three-quarters of a million sterling is about the annual expenditure upon gas in Ireland at the present time; but a portion of the outlay is incurred for power, heating, and cooking purposes. On candles imported into the country, we pay £100,000 per annum. Our paraffin oil bill runs into nearly £400,000 yearly. Approximately the inclusive cost of lighting our streets, roads, and buildings of every class is not less than £1,500,000 sterling per annum."

Torpoint Water Supply.—The Admiralty have once more entered into negotiations with the Torpoint District Council with a view to securing a supply of water for works which the Government contemplate carrying out in the Torpoint district. In a letter addressed to the Council by the Superintending Civil Engineer at the Devonport Dockyard, it is stated that at least 1½ million gallons of water per annum will be required by the new works, and that the Admiralty would reserve to themselves the right to take a larger quantity. The Council, whose previous negotiations with the Admiralty led to disappointment through a sudden change of policy by the Government, decided to refer the subject to the Water Committee for consideration. In the meantime, further details as to the Admiralty's plans and the probable revenue have been asked for; and it has been pointed out that such an augmentation of the water supply as seems to be contemplated would involve the Council in a heavy capital outlay and the cost of promoting a Bill in Parliament.

Unprofitable Electric Lighting at Sleaford.—Mr. J. A. Cole, the District Auditor, has made his report on the electricity accounts of the Sleaford Urban District Council for the year ended the 31st of March last. Its nature may be gathered from the fact that the Local Government Board expressed a wish to be furnished with the observations of the Council thereon when they had considered it; and this has been done. In the course of his report, Mr. Cole says: "Every effort should be used to reduce the working expenses, as the deficiency has to be met by means of the general district rate, which amounted during the year under audit to £290 14s. 10d. I find that the cash produced from sale of current amounted to £840 9s. 11d., which is less than the previous year. I gathered from the Engineer that at the price charged for current used in motors there was not a large margin of profit; and it is perhaps desirable that further investigation into this matter should be carried out. The cost of public lighting should not, of course, be included in the wages charged to cost of generation." At the meeting of the Council at which this matter came up, it was stated that the Electric Lighting Committee were doing their utmost to keep down the expenses.

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New Joint-Stock Companies.—The Pressure-Clock Lamplighter, Limited, has been registered with a capital of £8250, in 5000 £1 shares and 65,000 1s. shares, to take over the invention of Mr. George Robson, for automatically turning on and off the lights of gas-burners, and the apparatus therefor, and to enter into an agreement with him and the Automaton Gas Lamplighter Proprietary, Limited. The Mercury Safety Air-Gas Company, Limited, has been registered as a private Company with a capital of £5000, in £1 shares, to acquire patent rights for improvements in plant for the generation and storage of carburetted petrol and like gas, and to carry on the business of manufacturers of gas plant and machinery.

Lord Avebury on Municipal and National Trading.—At the *conversazione* of the London and Suburban Ironmongers' Association, held at the Holborn Restaurant on Monday last week, Lord Avebury delivered an address, in the course of which he gave the following as his reasons for opposing municipal trading: Municipalities and the Government had quite enough to do without going into matters of trade; if they did engage in commercial ventures, national indebtedness would be increased, which was an evil; this policy would bring them into conflict with labour, and the services would be more expensively carried on; it was a check to progress and discovery; and it afforded an opening for corruption, such as had been witnessed at San Francisco and New York. His Lordship elaborated these points separately.

Tiverton Public Lighting.—At a meeting of the Tiverton Town Council last Tuesday, the Streets Committee presented a report from the Borough Surveyor (Mr. J. Siddalls) and Gas Manager (Mr. Clark Jeffery) on the incandescent system of gas lighting, and recommended that about 40 of the full-service lamps and about 50 of the short-service lamps be extinguished at eleven o'clock each night, and that all the lamps (except those in courts) should be lighted every night throughout the year. The resultant saving on the gas used for lighting would be about £124 per annum; but the cost of extra labour in extinguishing the lamps at eleven o'clock, which the Gas Manager stated would be £50 a year, would have to be paid to the Gas Committee until the Lighting Committee saw their way to the general adoption of automatic lighting controllers. This would leave the net reduction in the cost of public lighting at £74 a year. The Committee further recommended that the conversion of the ordinary lamps into incandescent burners should be gradually extended in the town. The report was adopted.

Gas Poisoning at Cambridge.—An inquest was held last Wednesday at Cambridge on the body of Elizabeth Gathercole, aged 83, who died from the effects of gas poisoning. Deceased was found in her bedroom on the previous morning in a state of collapse, there being a strong odour of gas in a cupboard about 4 feet from her bed. Medical aid was summoned, and under treatment she partially recovered; but she died early next morning. Dr. W. Nicolls, who was called in, said the collapse was due to gas poisoning, and there was enough gas in the room to overcome any ordinary person. Deceased had been about three hours under the influence of the gas, and her age was against her recovery. Mr. J. W. Auchterlonie, the Engineer and Manager of the Cambridge Gas Company, stated that the report of the escape was received at the office about ten o'clock in the morning, and they immediately sent a man to investigate the matter. They did not find any pipes in the house, and the road was opened and the main found to be cracked. This was due to some heavy weight having passed over it. The ground around the defective spot did not smell as if there was an escape of gas. Witness thought the only way by which the gas could have found its way into the deceased's bedroom was through the foundations and floor. The Jury found a verdict of "Accidental death from gas poisoning."

Assessment of the Woking Water Company.—At the last meeting of the Guildford Board of Guardians, the Clerk (Mr. W. S. V. Cullerne) replied to a series of questions put some time ago in regard to certain assessments at Woking. The most important was whether a reduction of £580 had been allowed by the Assessment Committee to the Woking Water Company in respect of Woking parish, and whether any reduction had been made in other parishes. He explained that the Company, upon the new valuation, appealed against their assessment in eleven or twelve parishes, with the result that the Committee confirmed the assessment in certain cases, increased it in others, and decreased it in some. The net increase was £410 gross and £262 rateable, and the net decrease £247 10s. gross and £962 rateable. The result of the objection to the valuation list by the Company was that the Committee saw fit to reduce the assessment in the rateable value made by Mr. Eve by £700 10s. for Woking. The Company were not satisfied, and appealed to the Quarter Sessions against the assessment in the parishes where the Committee had made reductions. There was a meeting of the Engineers on both sides, and a compromise was arrived at. Under this the Company, instead of having a reduction in their total rateable value, consented to an increase of £62. While there had been a reduction in the assessment in Woking parish of £700, there had been an increase in West Clandon of no less than £225, which the Company had agreed to, and of £37 in West Horsley. From a union, and not a parish, point of view, there was an increase of £62 in the rateable value.

After church service last Sunday week, there was a brief failure of the electric light at Brighton. So far as the streets were concerned, it was little more than momentary.

About thirty members of the moulding class at the Halifax Technical School, accompanied by their teacher (Mr. J. Robinson), had an instructive time last Saturday afternoon. Through the kindness of the firm, a visit was paid to the works of the Campbell Gas-Engine Company; and the party were conducted round the extensive premises—the students finding much to interest them.

When some of the Committees of the Manchester Corporation met to elect their Chairman and Vice-Chairman for the ensuing year, a remarkable record of continuous service, says the local "Courier," was chronicled in the case of the Gas Committee, when Alderman Gibson was elected Chairman for the seventeenth year in succession, and Alderman Briggs Deputy-Chairman for the fourteenth year.

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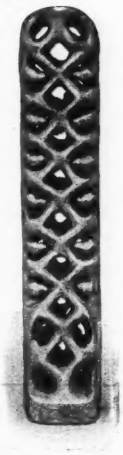

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We learn that Mr. Arthur C. Frost, who has for the past nine years been engaged with the Sutherland Meter Company, of Witton, Birmingham, first as traveller and later as commercial manager, has now been appointed General Manager, and will have his headquarters at the works.

After negotiations extending over two years, the Abertillery and Abercarn Urban District Councils have decided to go to Parliament next session with a Bill for the formation of a Water Board. The proposal is to take water from the Grwyne Vawr Valley in Breconshire, and to convey it to the Western Valleys of Monmouthshire. The Bill to be promoted will provide for the Risca or any other local authority joining the Board if they so desire. Messrs. Baldwin Latham and Rofe and Son, of Westminster, are the Engineers; and Mr. T. S. Edwards, of Newport, will act as Solicitor. The scheme is estimated to cost about £225,000.

We understand that the arrangement made last year with Metropolitan Gas Meters, Limited, with regard to the "Rapid" light controller has now terminated, and that the Rapid Light Controlling Syndicate, Limited, of No. 11, St. Helen's Place, E.C., have resumed the sale and supply of their apparatus direct.

We have received from Mr. William Edgar, of Hammersmith, a new illustrated catalogue—compact, smart, and up-to-date. Everything is well described, illustrated, and indexed in a thoroughly clear manner. Gas-lamps and lanterns with upright and inverted burners, gas-fittings and accessories, and other things appertaining to the gas industry, are included in it. Some of the most recent items are an automatic flashing device for advertising purposes, a "Luminary" stove for heating halls, &c., the "Cutmore" greenhouse heater, and so on. The well-known "Blenheim" gas-fire is also illustrated. Much care must have been taken in compiling the catalogue.

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HARROW AND STANMORE GAS COMPANY. Dec. 7.
MITCHAM AND WIMBLEDON GAS COMPANY. Dec. 6.
SOUTHEND WATER COMPANY. Dec. 7.
WORTHING GAS COMPANY. Nov. 23.

TENDERS FOR

Sulphur (Recovered). No. 5154.

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BALE'S FIRE CEMENT.
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SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
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HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
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"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
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MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

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AMMONIACAL Liquor wanted. Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.
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Telegraphic Address: "Fitzmaurice, London." Telephone: No. 11,113 Central.
Established 1887.
Advertiser, who is Shipping Agent to several Gas Companies, Municipalities, and Gas Material Makers, would be glad to undertake SHIPMENT OF GOODS ordered by Colonial Gas-Works or Others.

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Nov. 2, p. 357.

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FOR REALLY RELIABLE
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RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
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SIMULTANEOUS Discharging-Charger. The one Machine which Discharges and Charges at One Stroke.
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We guarantee promptness, with efficiency for Repairs.
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Wires: "Automatic, Manchester."
40 YEARS' REPUTATION.
WET, DRY, ORDINARY and PREPAYMENT, STATION METERS, &c.
Late of Oldham—Note *new* Address:—
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GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
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SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
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APPLICATIONS for Appointments arranged effectively. Greatly appreciated by Recipients. Numerous unsolicited Testimonials. Write Now for Particulars.
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YOUNG man just completed Indenture at a large Provincial Gas-Works desires Position as ASSISTANT. Good Draughtsman and Chemist. Highest References.
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SITUATION wanted by Advertiser (Age 36) as GENERAL FOREMAN of Large Works or MANAGER of Medium-Size Works. Home or Abroad. Thoroughly Experienced in all Gas-Works Plant, Machinery, and Routine. Abstainer. Excellent Character.
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WANTED, at once, in the South of England, a CANVASSER and SHOW-ROOM ASSISTANT. Must be a capable Burner Maintainer.
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WANTED, in a large Provincial Water Department, a CONFIDENTIAL CLERK, having a knowledge of Shorthand, Typewriting, Water-Works Statistics, and Office Routine.
Also, Experienced WATER RENTAL and ASSESSMENT CLERK.
Apply, by letter, stating Age, Experience, and Salary required, to No. 5150, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

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Two AIR COMPRESSORS, by Thos. Larmuth and Co., Ltd., Type No. 1, Class "D," 12-inch Cylinders.
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Seven 3½ inch ROCK DRILLS, by Thos. Larmuth and Co., Ltd., and about 16 cwt. of Drills.
About 7000 Yards of SHEET-IRON AIR PIPES, 20 inches diameter, 9 feet long, 16 W.G. Thick.
Offers invited.
For further Particulars, Apply to the General Manager, Sheffield Corporation Water-Works, Town Hall, Sheffield.
Nov. 11, 1909.

BRENTFORD GAS COMPANY.

SALE BY TENDER OF £30,000 NEW STOCK, 1881.

IN pursuance of the Brentford Gas Order, 1881, Notice is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £30,000 of NEW STOCK, 1881, of the Company, to be paid up in full on or before the 15th day of January, 1910; such Stock being a portion of Additional Capital Authorized to be raised by Resolutions passed at an Ordinary Meeting of the Proprietors held on the 11th day of February, 1898, under the powers of the above-mentioned Order.

Particulars and Conditions of Tender may be obtained on Application at this Office; and Sealed Tenders must be sent in not later than Ten o'clock on the Morning of Wednesday, the 15th day of December next.

By order,
William Mann,
Secretary.

Office: Brentford Gas Company,
Brentford, Nov. 1, 1909.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of Ammonia Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
Telegrams: "Chemicals, Oldbury."

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
WORTHING GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £4085 CONSOLIDATED ORDINARY STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 23, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
BOGNOR WATER COMPANY.

NEW ISSUE OF 250 £10 ORDINARY SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 23, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

NEW ISSUE OF £32,000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 23, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 500 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES
AND
£5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 7, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
HARROW AND STANMORE GAS COMPANY.

NEW ISSUE OF 500 £10 "C" SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 7, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

Issued under the powers and subject to the provisions of "The Mitcham and Wimbledon Gas Act, 1907."
MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

NOTICE OF SALE BY TENDER OF £12,000 CONSOLIDATED ORDINARY STOCK.

Minimum Price of Issue £108 per £100 of Stock.

THE Directors of the Mitcham and Wimbledon District Gaslight Company Hereby Give Notice that they will be prepared to receive, not later than Five o'clock p.m. on Monday, the 6th day of December, 1909, Sealed Tenders for £12,000 CONSOLIDATED ORDINARY STOCK of the Company, in lots of the nominal amount of £50, or Multiples thereof.

No Tender for any less nominal amount than £50, or at a less price than £108 per £100 of Stock, will be entertained,

The Balance of the Purchase Money is to be paid on or before Monday, the 3rd day of January, 1910. Dividend will accrue from the 1st day of January, 1910.

Tenders must be made on Forms provided by the Company, which, with Particulars and Conditions of Sale, can be obtained on Application to the undersigned.

Benjamin Green,
Secretary.

Offices and Works, Western Road,
Mitcham, Surrey.

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WESTMINSTER.

JOHN COATES & CO., LTD.,
Gas and Water Works Engineers, Inspectors, and Merchant Shippers,
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HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

LUX'S
Gas Purifying Material
is now used in many Gas-Works throughout Scotland with gratifying success.

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Descriptive Pamphlet on Application.

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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
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MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

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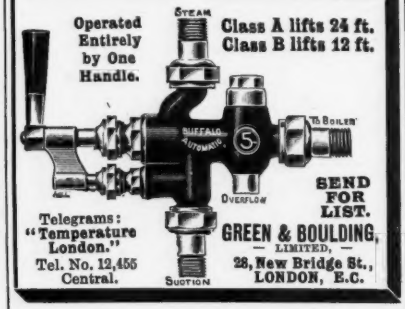
'BUFFALO' INJECTOR
Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.


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RETORTS CAREFULLY PACKED FOR SHIPMENT.

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Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
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NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
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JAMES OAKES & CO.,
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Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

THOMAS TURTON AND SONS, LIMITED,
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MANUFACTURERS OF
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STEEL OF ALL DESCRIPTIONS.
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GAS PURIFIERS.

SPENCER'S PATENT, No. 1576 of 1905.

NOTICE IS HEREBY GIVEN, that Proceedings for Infringement of this Patent will at once be taken against any person using in Gas-Purifiers Inclined Supports and Bars or Laths supported thereby so as to make the Laths break joint.

Dated this 2nd day of November, 1909.

JAMES CLARKSON,
Solicitor for Walter Spencer, of Elland, Yorkshire.
the Patentee.

Town Hall Chambers, Halifax.

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VOL. CVII.

OF THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, &c.

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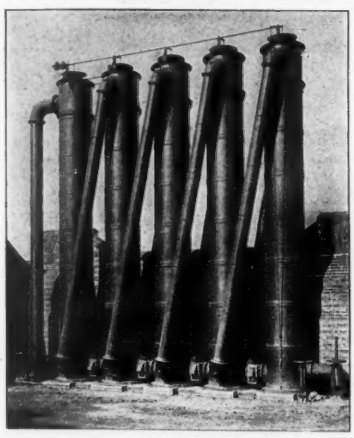
AN EPOCH IN GAS MANUFACTURE.

THE VERTICAL GAS RETORT SYNDICATE, LIMITED,

(DESSAU SYSTEM)

17, VICTORIA STREET, WESTMINSTER, S.W. (*See Full Page Advertisement, p. III., Oct. 5.*)



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Construction of

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With and without Recovery of the Bye-Products, Tar and Benzol Distilleries, Ammonia Works, and Cyanogen Extraction Plants.

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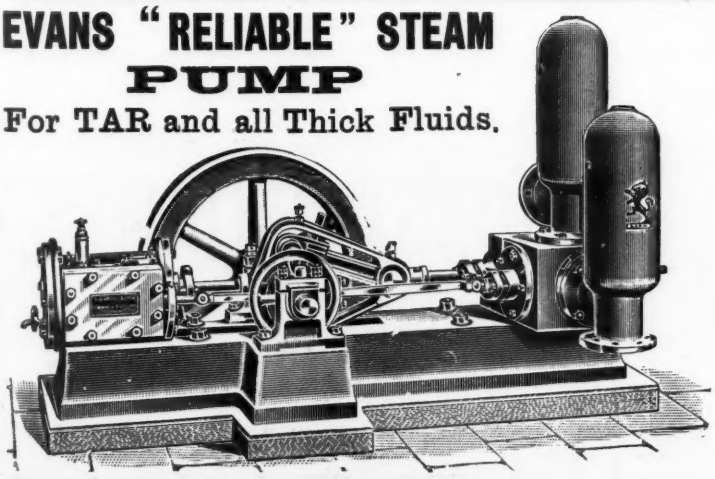
For TAR and all Thick Fluids.



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STOPPING CRACKS
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COAL AND COKE STORAGE PLANTS.
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THE CHIEF GASWORKS
IN THE BRITISH ISLES
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FOR
MANUFACTURED FROM
OUR
CAREFULLY SELECTED
AND
WELL SEASONED STOCK
OF
OLD MINE FIRE CLAY.
RETORTS

MAIN LAYING.

Paper by PERCY GRIFFITH, M.Inst C.E., and BRUCE McGREGOR GRAY, Assoc.M Inst.C.E., before the Association of Water Engineers.

A. The Authors used *Flanged Pipes* for the Rising Main up the Steep side of the Barff, and their experience proved that this was not an advantage, as *the rigidity of the Joints involved considerable difficulty* in regard to the depth of the Trench, and a good deal of Cutting to make the final Connections at each end of the Pipe-Line.

B. In the case of the Delivery Main, the Joints were *Ordinary Socket Joints*, but made with Lead only. The only difficulty met with here was the necessity for *pouring the Lead in* at a suitable temperature *to prevent it melting the Solid Lead Fillet*, and *running through into the Pipe.*

C. In some of the Smaller Branch Connections, Lead Wool was used, and proved highly successful.

Particulars from

THE LEAD WOOL CO., LTD., SNODLAND, KENT.

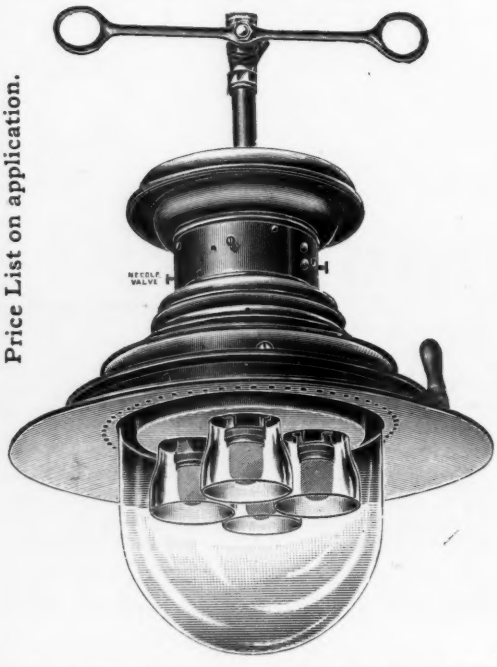
500 CANDLE POWER
OUTSIDE
LAMPS
Fig. I.586.
4 BURNERS.

All Copper Case—natural colour. **50/6**

Olive Green Vitrified Enamelled Steel Case **47/-**

USUAL DISCOUNT.

Price List on application.



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Number of Burners 2 3 4

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Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

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From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

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Carburetted Water Gas Plant.

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Messrs. S. CUTLER & SONS are Contractors to the Vertical Gas Retort Syndicate, Ltd., for all Constructional Steel Work, Operating Gears, Fittings, &c., &c.

The DESSAU System has been adopted at 45 Gas-Works and up to the present date 3882 Retorts have been ordered.

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Every Requirement for Gas-Works Supplied.

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OVER 600
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Station Meters
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WILSON CARTER & PEARSON,
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Gas, Steam, and other Fuel for Home and Export.
GAS COKE CONTRACTORS.
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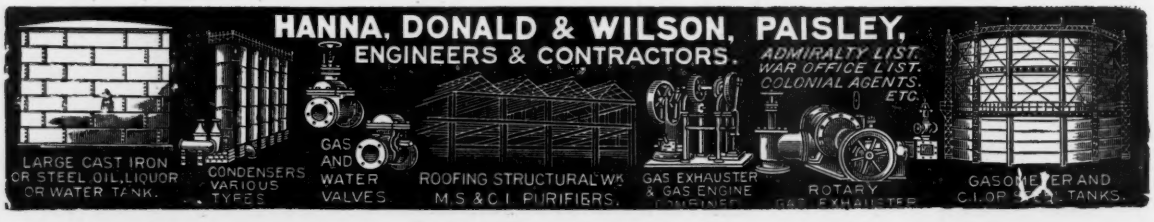
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GAS EXHAUSTER & GAS ENGINE
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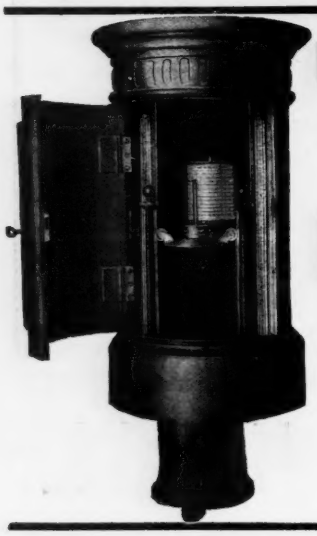

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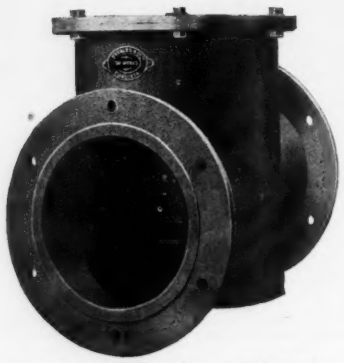
Tay Works, EDINBURGH.

PATENT
DISTRICT GOVERNOR
FOR
Ordinary or High Pressure.

PILLAR BOX contains Air-Pressure Holder for Loading the Governor from a distance also Recording Gauge and Inlet and Outlet Pressure Gauges.



LARGE MERCURIAL GOVERNOR.
From a Photo. of 24 in. Size.
May be Loaded by Weights or Air Pressure from a Distance.

NEWTON, CHAMBERS, & CO.,
LIMITED.
THORNCLIFFE IRON-WORKS, near SHEFFIELD.
Established 1790
LONDON OFFICE: **Brook House, 10-12, Walbrook, LONDON, E.C.**
Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, and CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF
PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.
PURIFIERS with Planed Joints a Speciality.
PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.
DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (special quality) for Engine Cylinders. **GAS COAL** famous for its Unrivalled excellence.

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GRAHAM, MORTON & CO., LEEDS.

Inclined and Horizontal Retort Benches.

CONTRACTORS TO
The Vertical Retort Syndicate, Ltd., London,
FOR ALL THE
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IN THE
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COAL CONVEYING PLANTS
COMPLETE WITH
ELEVATORS, CONVEYORS, BREAKERS, &c.

THOMAS PIGGOTT & CO.,
LIMITED,
BIRMINGHAM, ENGLAND.

IMMEDIATE DELIVERY FROM STOCK.
UNBREAKABLE.
EASILY ERECTED. LIGHT FOR SHIPMENT.

Capacity, 9600 Galls. *Size, 16 × 12 × 8 ft. deep.*

PATENT PRESSED STEEL TANKS.
MADE FROM FLANGED PLATES 4 FT. SQUARE.
ANY CAPACITY IN MULTIPLES
OF 4 FT. LENGTH, WIDTH, OR DEPTH.

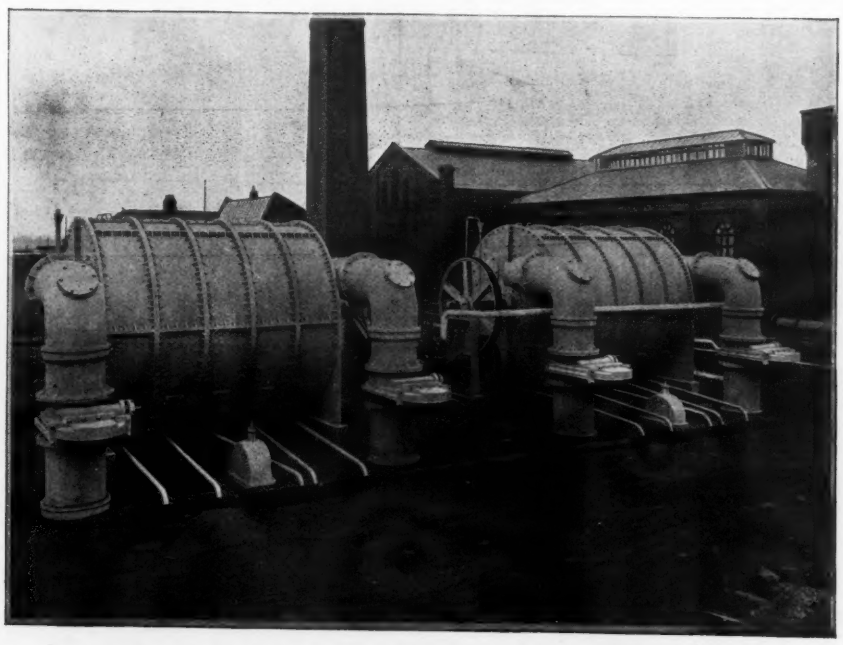
HUMPHREYS & GLASGOW'S CARBURETTED WATER-GAS PLANTS.
Aggregate capacity of Plants supplied,
227,800,000 cubic feet daily.

THE WHESSOE FOUNDRY CO., LTD.,

Works: DARLINGTON.

LARGE AREA OF WASHING SURFACE.

REMOVAL OF THE WHOLE OF THE AMMONIA AND A LARGE PERCENTAGE OF CO. AND SH.



SLIP OF GAS IMPOSSIBLE OWING TO OUR PATENT TELESCOPIC SLIDING JOINT

BUNDLES EASILY ACCESSIBLE FOR CLEANING.

"Whessoe" Twin Rotary Washer-Scrubber (Patent No. 24,110 of 1903). **Combined capacity 3,000,000 cub. ft. per diem,** as supplied to The Walker and Wallsend Gas Company, Newcastle-on-Tyne.

London Office: 106, CANNON STREET, E.C.

R. LAIDLAW & SON (EDINBURGH), LTD.

GAS METER MAKERS.

DRY METERS
IN
TIN AND IRON CASES.

WET METERS
IN
TIN AND IRON CASES
WITH ORDINARY AND
COMPENSATING DRUMS.

All Materials used in the Manufacture of these Meters are of the best quality, and the Workmanship of the Highest Standard.

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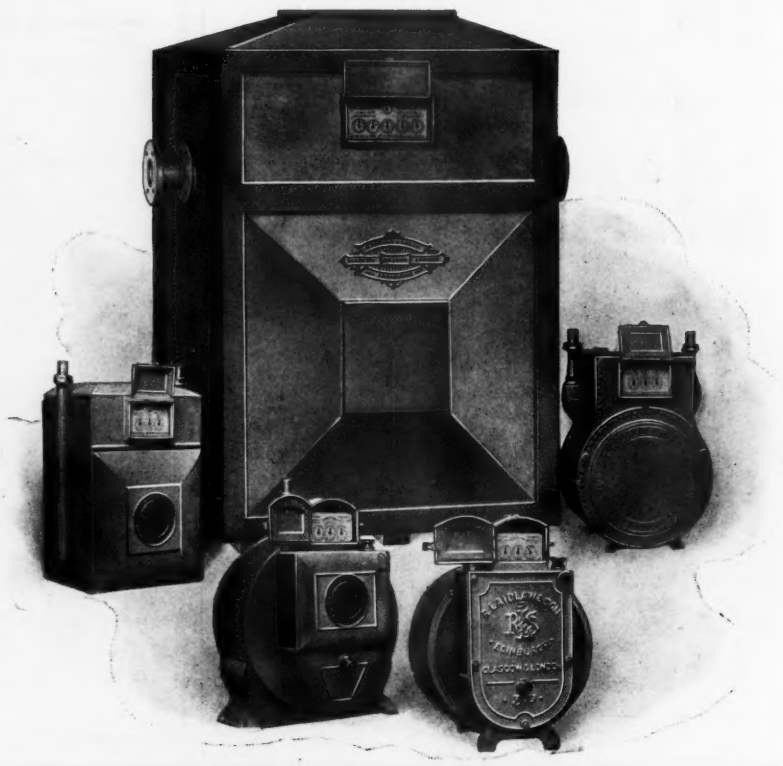


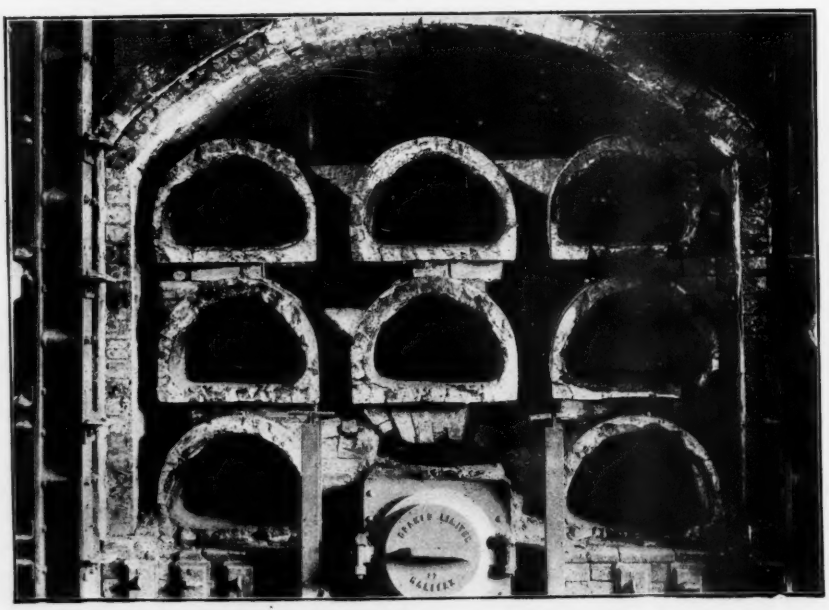
YET ANOTHER RECORD.

2323 DAYS' WORK.

All our Retorts are Patent Machine made.

Horizontal, Inclined, Vertical.

Special Patent Expanding Dies for making Taper Retorts at one operation.



Bricks, Tiles, and Blocks for all Types of Settings.

Specials.

Silica Bricks.

Alumina Bricks.

Non-Con. Cement.

REPORT.—"This Bed worked for **2323 days** at high heats, and is still in very fair condition. **Working results were exceptionally good.**"

The LEEDS FIRECLAY CO., Ltd.

Telegrams:
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610, 612, 1649, 2322, Leeds.

Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

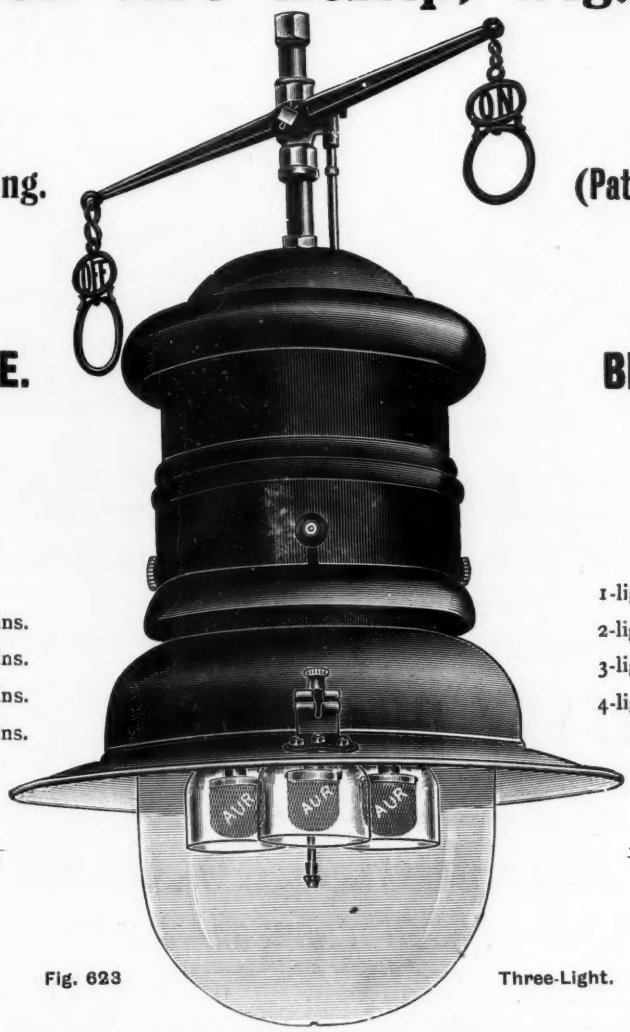


Fig. 623 Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.
3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

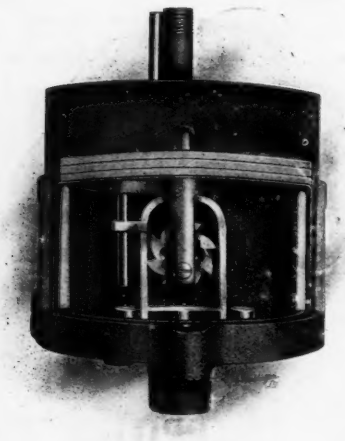
THE WELSBACH INCANDESCENT GAS LIGHT CO., LTD.

Welsbach House, 344-354, Gray's Inn Road, London, W.C.

Telegrams and Cables: "WELSBACH LONDON." *Telephone 3410 NORTH.*

The "A. & M." Patent Automatic Gas Apparatus for Street Lighting.

Small. Efficient.
Simple. Cheap.



SECTIONAL DIAGRAM. HALF FULL SIZE.

CONTROLLED FROM THE GAS-WORKS.

Saves Labour, Gas, Mantles, and Glasses.

Can be brought into action at any hour.

Requires no Winding.

Can Extinguish Different Lights at Different Times as required.

Nothing but Metal in it. No Leather, no Rubber, no Glass.

Has Stood the Test of Years.

Is "All British." Nothing Made Abroad.

ALDER & MACKAY,

EDINBURGH, BRADFORD, BIRMINGHAM, and LONDON.

ESTABLISHED 1850.

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE.

MAKERS OF **GASHOLDERS & GAS PLANT.**

PURIFIERS, SCRUBBERS. CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS. RETORT-FITTINGS, ETC.

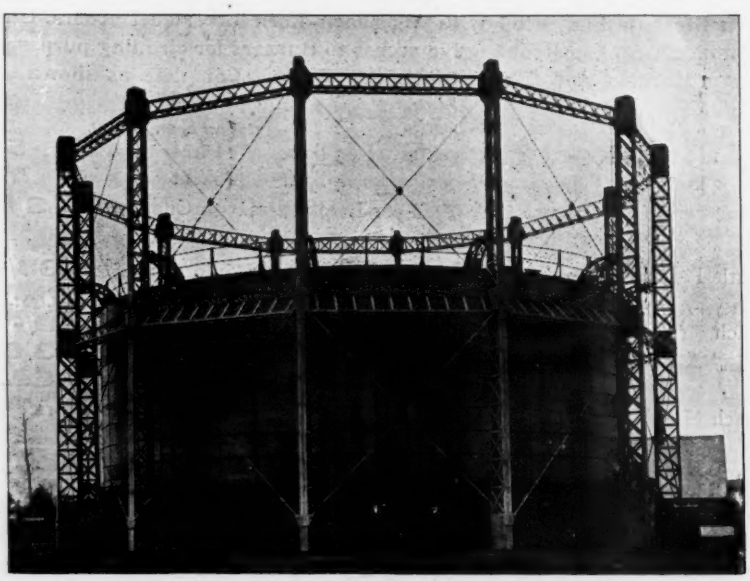
ALSO ALL KINDS OF

STRUCTURAL IRON AND STEEL WORK.

BRIDGES,

ROOFS,

PIERS, ETC.



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Imitation is the sincerest Form of Flattery.

TRADE MARK

Tubes of other Origin are often Sold as

MANNESMANN TUBES,

But none are Genuine if they do not bear our Trade Mark as per above facsimile.

THE

BRITISH MANNESMANN TUBE CO., LTD.,

Salisbury House,

LONDON WALL, LONDON, E.C.

Makers of

WELDLESS STEEL SPIGOT and FAUCET, SCREWED and SOCKETTED, FLANGED, &c., TUBES, TUBULAR LAMP POSTS, DRUMS, &c.

CLEANING COOKERS AND LANTERN REFLECTORS

Undoubtedly the Finest and Best Preparation on the Market for **quickly** removing Burnt Grease from the Enamelled Lining of Cookers and Cleaning Lantern Reflectors is

Clarks "GASCOLITE."

(Registered Trade Mark.)

Can either be applied with a Brush, allowed to stand, Cold, for a few hours, or with Heat for about Half-an-Hour, when Liners and Reflectors can be washed off with Hot or Cold Water and will appear as **new,** or, **put into Tanks** with **Boiling Water,** when Liners and Reflectors will be cleaned in about 20 Minutes.

In cases where a **steam pipe** is connected to bottom of tank, stoves or liners can be **perfectly cleaned** in 5 to 10 minutes.

This Result can only be obtained at **lightning speed** by using **"Gascolite."**

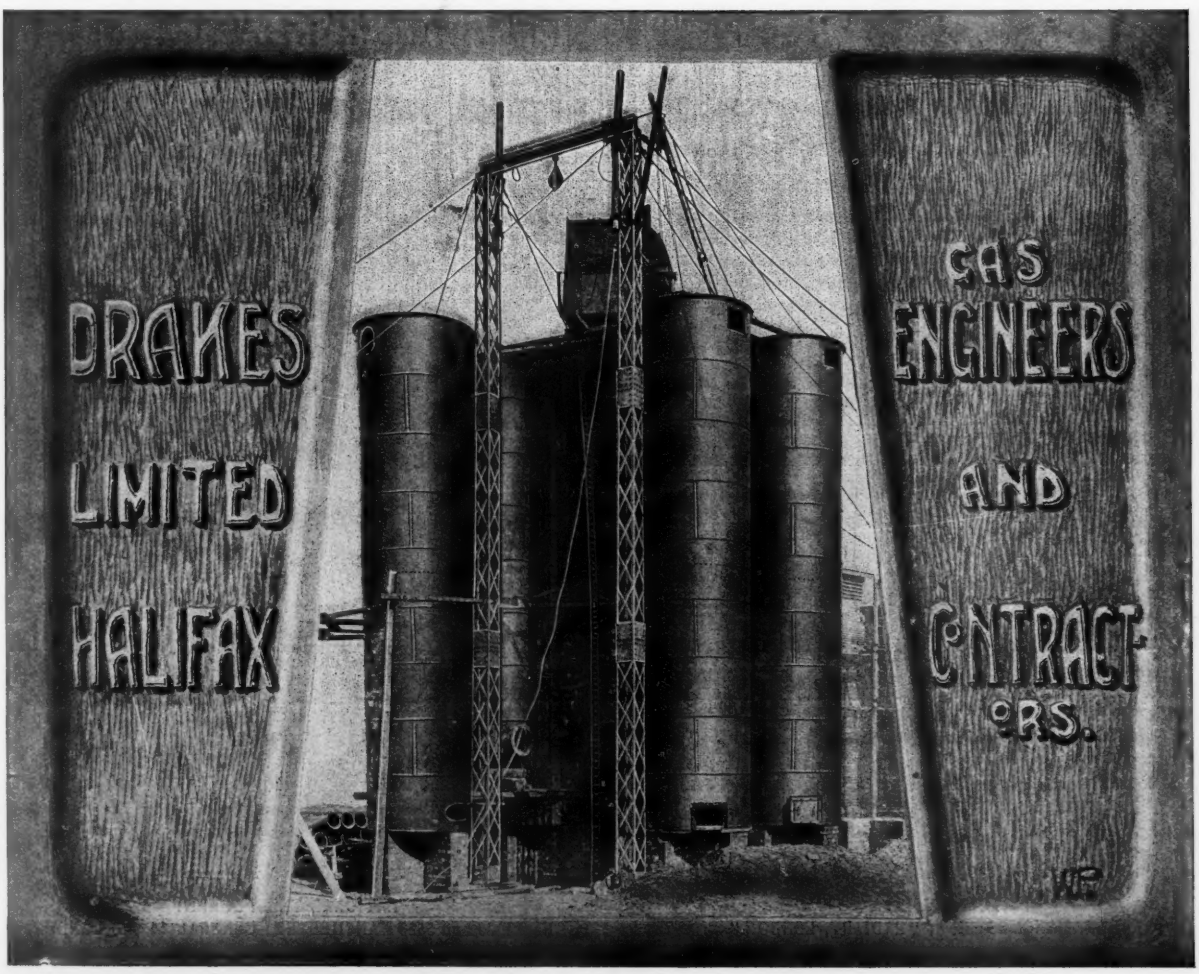
Now being used successfully by Gas Companies throughout the United Kingdom and Abroad.

For Trade Prices apply—

CLARKS LEAD & COLOUR WORKS CO.

Gas Company Specialists, **READING.**

Established 1832.



CONTINUOUS CARBONIZATION

IN

VERTICAL RETORTS

GLOVER-WEST PATENTS.

Extracts from Tests made by

Dr. HAROLD G. COLMAN

at the St. Helens Gas-Works.

DURHAM (THORNLEY) COAL.

Gas made per Ton	13,102	cubic feet.
Fuel Consumption	12·3	lbs. per cent.
Illuminating Power	15·56	No. 2 Met. Burner.
Calorific Value	573·6	B.Th.U. (Gross).

YORKSHIRE (SILKSTONE), BARROW COLLIERY.

Gas made per Ton	12,435	cubic feet.
Fuel Consumption	13·4	lbs. per cent.
Illuminating Power	16·19	No. 2 Met. Burner.
Calorific Value	584·9	B.Th.U. (Gross).

LANCASHIRE, WIGAN (ARLEY MINE).

Gas made per Ton	12,145	cubic feet.
Fuel Consumption	12·2	lbs. per cent.
Illuminating Power	15·22	No. 2 Met. Burner.
Calorific Value	576·2	B.Th.U. (Gross).

See "JOURNAL OF GAS LIGHTING," June 8 & July 20, 1909, for description and results.

For further Particulars, apply to—

WEST'S GAS IMPROVEMENT CO., LTD.,

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